School Shop

vol. XV no. 4
DECEMBER 1955

Boliva's Industrial-Education Program
by Claire Jones
Include Radio in Your Shop
by Ruehl and Hoffman
Polishing and Buffing
by Maurice Overholt
The "Putt-Putt" Era
by Warren Haas

Cover story: Keeping track of tools turned out to be just as much of a problem in Bolivia as it is in the United States. Now, tools are checked in and out of this crib by student help and although there is no word for tool crib in Spanish, *Gabinete de Herramientas* seems to serve the purpose. See page 9 for story on Bolivian school

THE MAGAZINE FOR TEACHERS OF INDUSTRIAL EDUCATION

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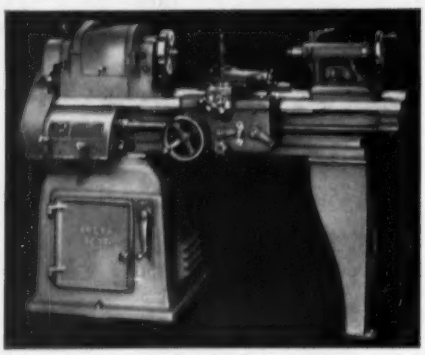

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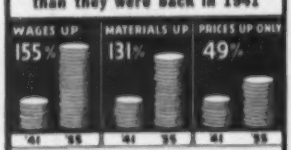

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BPA

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

If the Schools Don't, Labor Will

Organized labor is frequently said to be opposed to industrial education. A look at the history of the labor movement will show that this view is erroneous.

In the early nineties, long before the enactment of the Smith-Hughes law, Samuel Gompers contended in a number of his speeches that we should have more of the type of education that served the "bread-and-butter" needs of our workers. During these early years, too, several resolutions were adopted at the national conventions of the American Federation of Labor favoring more educational activities designed specifically for workers.

At that time union officials were not informed concerning educational matters, so they looked to the public schools to become active in implementing an acceptable program. Unfortunately, the school people were just as uninformed about the educational needs of industry as the tradesmen were about school procedure. The result was that school authorities tended to follow the traditional practices in education and make their new program fit what they, with their limited knowledge, conceived to be the industrial requirements.

The idea of calling in representatives of the various trades to guide them in their efforts to build a suitable program did not occur to them. The result of this omission was that many of the attempts to conduct trade classes were definitely frowned on by the men with whom the pupils would have to work later.

The unions were aware that the training program should be more effective because they were conscious of the needs of workers. As they studied the programs in operation, they rapidly learned about educational practices and began to develop concrete ideas concerning how they could be improved.

As their knowledge grew, they became active in their efforts to correct the errors that were apparent in the procedures initiated by the educators. After spending considerable effort, they convinced the school people that they were in a position, and had the know-how, to guide the teacher in the selection of what he should teach. From this developed the advisory committees which serve so effectively in so many situations today.

The union representatives were not constrained by tradition, as is the school person, so they soon broadened their point of view on industrial education far beyond the thinking of the average teacher. More and more they began to realize the immensity of the task of training a high-grade mechanic.

Finally they induced the employers to pay apprentices their prevailing rate during the time they were in class, and later convinced some to organize educational facilities in their plants in communities where the public schools were unable, or unwilling, to provide the type of instruction they felt was needed.

Now labor is concerned again about industrial education. Recently a prominent official of the C.I.O. emphasized to a group of educators that technological advancement is progressing so rapidly and so consistently that the skilled worker of today, and tomorrow, must be kept abreast of the progress being made.

He expressed the belief that the public schools in many communities are doing a creditable job of modifying their programs to meet the changes in industrial practice. However, he regretted that in many areas the lag in public-school instruction behind modern industrial technology was so great that union leaders had begun to consider ways of improving the situation. He appeared to feel that many school people had become complacent about what they are doing, and he indicated, in a tactful way, that if they did not bestir themselves and keep their instruction abreast of modern ideas, the unions would have to undertake the job themselves—which we feel confident they can do.

Labor unions are interested in industrial education—very much so—even to the extent of providing schools and teachers of their own. They have the money, the will, and the know-how. Herein lies a challenge the school man cannot afford to ignore.—*T.D.*

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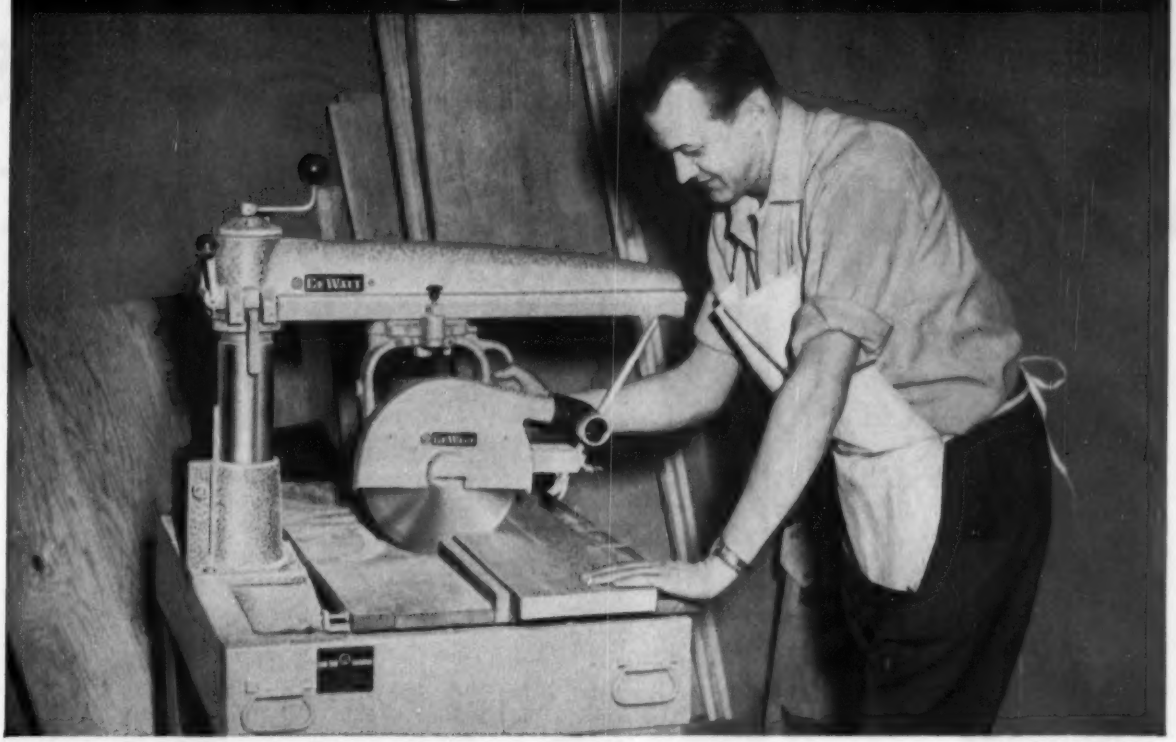

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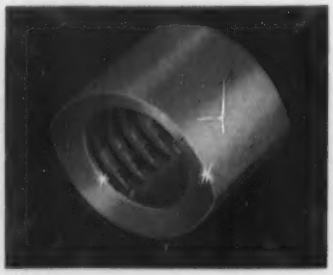

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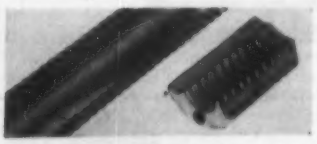

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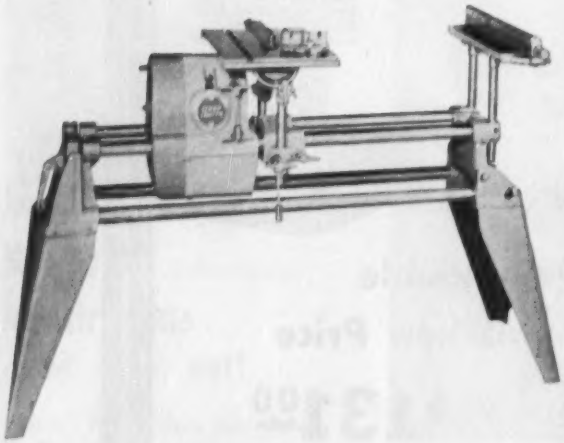

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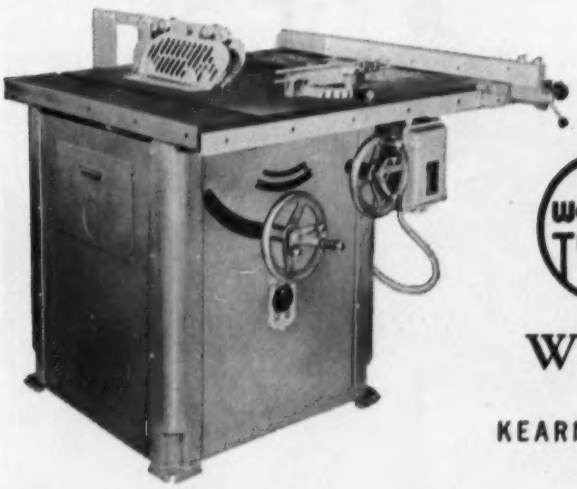

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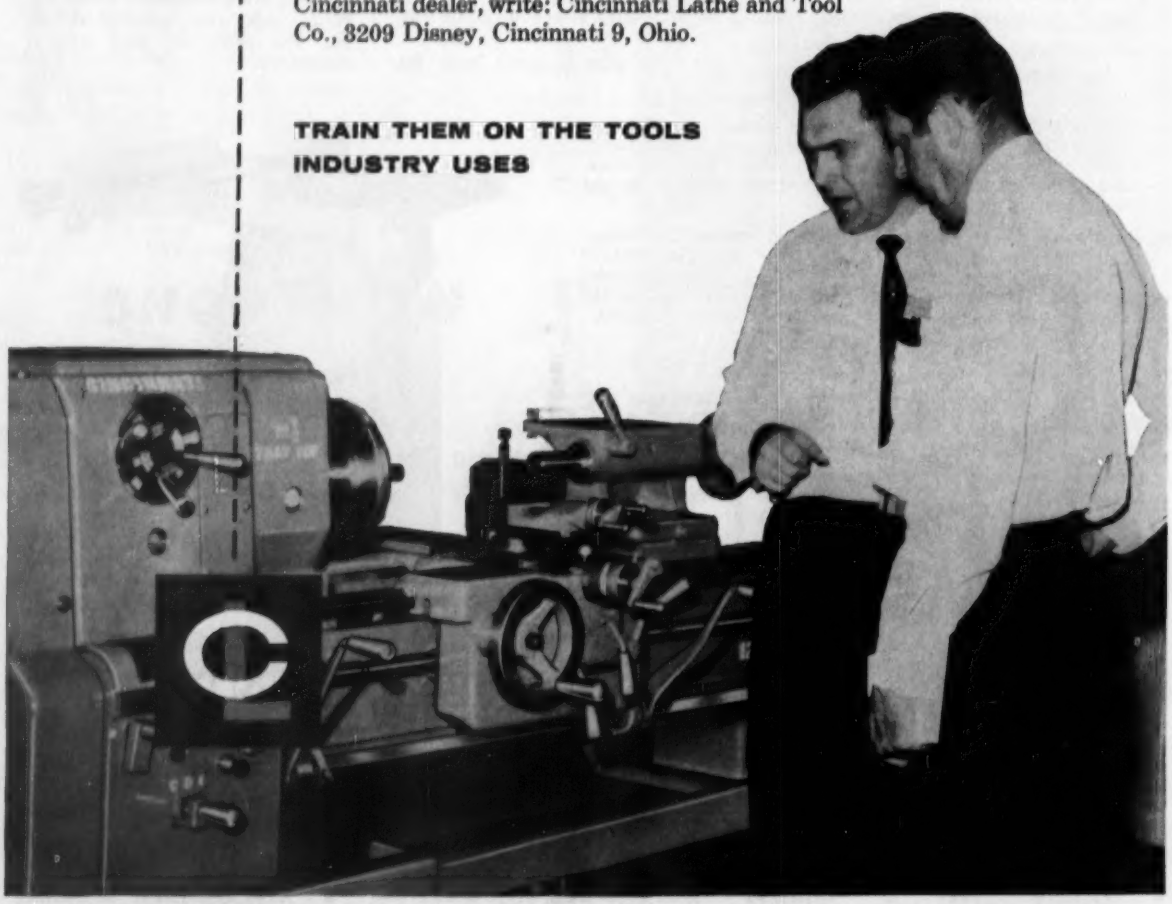

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Bolivia's Industrial-Education Program

By Claire Jones

Technical Director, Industrial Education, U.S. Educational Mission to Bolivia, La Paz

THE excitement of being tapped for a job in the educational program in Bolivia reached its peak as I peered out the windows of a plane flying me high over the towering western cordillera of the Andes mountains and then over Titicaca, sacred lake of the Incas and known as the highest navigable lake in the world.

This job as Technical Director of Industrial Education of El Servicio Cooperative Interamericano de Education (the SCIDE) in Bolivia which I was traveling these thousands of miles to begin, actually originated in 1942. At that time the Institute of Inter-American Affairs, a U. S. government agency, started programs of technical assistance to Latin America. In 1944, the educational program in Bolivia was initiated, following an agreement between our two countries to engage in joint action in the field of education. From this the SCIDE was created as a special agency and was set up locally to operate on a joint budget to which Bolivia contributes about three times as much as the United States. Our country loans educators to the program, one of whom, Dr. Thomas A. Hart, is director of the SCIDE.

We landed at the highest commercial airport in the world. The La Paz field is 13,404 feet high and located on the Bolivian altiplano, a great plains area measuring over 100,000 square kilometers between ranges of the Andes. A haughty llama is tethered at the airport so that tourists may have their picture taken with this high-altitude animal. But from his expression, the job is beneath his dignity. Not far from the airport a deep gorge crevices the altiplano and homes of the 300,000 residents of La Paz cling to the steep sides and then follow along the river Chuqeyapu at the bottom.

A little background of the country may help you understand the purposes of our jobs here in this picturesque land. The course of Bolivian history has been such that the country has been developed on a strictly raw material economy, the main product being tin, accounting for around 90 percent of Bolivia's foreign exchange. In other words, whatever the Bolivian government or the country's merchants want to buy from the outside world has to be paid for by dividends from tin. Consequently, the country is extremely vulnerable to the demand for tin and the price on the world market. Just recently, a jostling crowd outside the doors of a hardware store made us curious enough to investigate, and the word *herramientas* (tools) in the window told the story. A shipment of articles in short supply had come to town.

Though the population of Bolivia (3,150,000) is predominantly rural, agriculture brings little into the nation's coffers, for it is carried out on a subsistence level. Nor does industry count for much in the national economy. In the numberless little rural towns of Bolivia, you see nothing like the industrial busyness typical of small towns in the United States—no auto-repair shops or service stations, few carpentry shops, no small factories or mills. Artisans and skilled workers make up an extremely limited group in the country's population. The big job ahead, if Bolivia is to climb out of her economic crisis, is to turn her people into producers who contribute to the national wealth. And one way to accomplish this is industrial training.

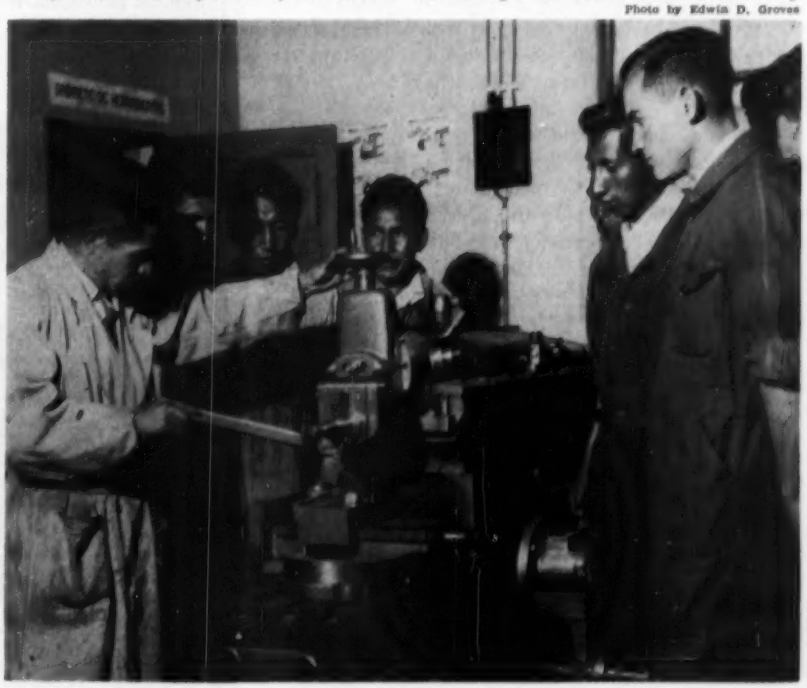
Their system of industrial schools, started some 12 years ago, consists of a series of industrial units attached to secondary schools in the departmental capitals, and a master school, Pedro Domingo Murillo, in La Paz, where students come for advanced industrial training. This system limped along under the handicap of a lack of equipment and a lack of trained teachers for some years. Because of Bolivian traditions in education, the idea of training *workers* did not prevail even in these schools, the emphasis being on producing specialists.

And schools and industry did not get together so that the stimulus which results from regular calls from industry for skilled workers was absent.

(*Continued on page* 20)

Bolivian students give the instructor (left) their respectful attention as he demonstrates a step in the operation of a shaper. Safety is stressed in the training of skilled workers in metalworking.

Photo by Edwin D. Groves



Cost is nominal; benefits are substantial! Here's how to

Include Radio in Your Shop

By Philip W. Ruehl and Frank M. Hoffman

Assistant Professor of Electricity, Electronics, and Radio, Stout State College, Menomonie, Wisconsin; and Instructor in Industrial Arts, Boys' Technical High School, Milwaukee, Wisconsin, respectively.

ONE of the excuses most often given for not including radio in a school-shop program is the fallacious one that great additional expense is involved. Or that the shop instructor is not capable of teaching electronics. Or that all available space is taken.

But electronics is an important part of this day and age. Students should have the opportunity to gain insight into this rapidly-accelerating field and a simple, low-cost method of teaching can be easily added to your curriculum. Elementary radio is the basis of the broad field of electronics. And a student may choose this field as his life's work after he once gains an understanding of radio.

Here is how a radio course can be inaugurated.

To overrule one objection, the instructor CAN be the present shop man. His knowledge of radio may at present be very limited, but this lack can be overcome by personal initiative. Knowledge of radio can be gained by spare-time study, teaching himself, or by night-school courses, if available in the area.

And he need not be an electronics technician to teach radio. However, a good understanding of the fundamentals of electronics and the principles of electricity is necessary. As the instructor works with this fascinating subject, he will probably find himself becoming more and more interested in the field.

So far, we have an instructor. But what about the equipment? Can your budget stand the additional expense involved?

It certainly can and here's how it's done!

A machine found in most every school shop is a metal lathe. Cost of purchasing a moderate-sized metal lathe will vary between $800 and $1000. So let's compare the cost of equipment for offering radio work to that of a single metal lathe.

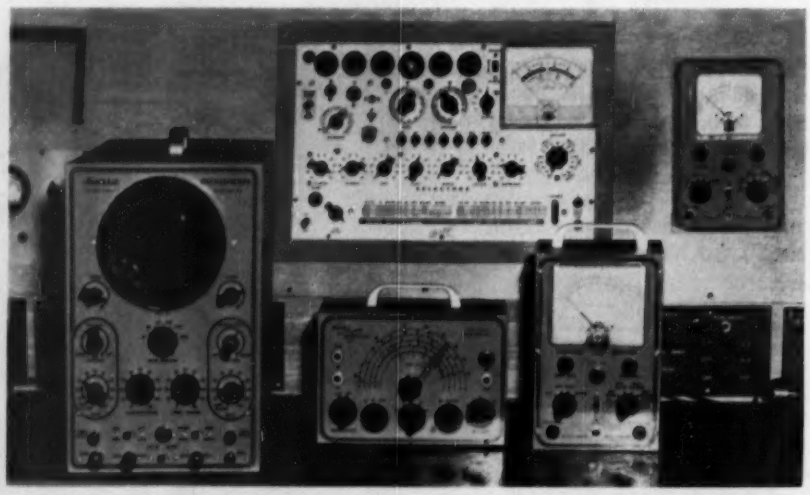
Here again, the instructor can use his own initiative and, from kits, build the various radio instruments he needs. With the exception of the tube tester, typical instruments (see photo) were built at Stout State College in the electrical shop. They include: (1) A vacuum-tube volt ohmmeter, costing approximately $25 in kit form, and used for alignment of the radio receiver, for trouble shooting, and for testing component parts; (2) An r-f (radio frequency) signal generator, $20 in kit form, used for alignment of the completed radio project; (3) An oscilloscope, $40 in kit form and $90 if factory built.

The $90 oscilloscope price is given here, since it may be desirable to buy the instrument in this way. It is used for giving a picture of the characteristics of the various electronic circuits in a radio receiver, and consequently would be somewhat difficult to construct. The first two instruments are surprisingly simple to assemble and no teacher should have much difficulty with these items. A tube tester suitable for school use can be built for approximately $40.

Very few tools are necessary. The required number of pliers, knives, etc., depends on the number of students taking the course. For our calculations here, we will consider a class of 12 students.

Just six different types of tools are necessary in a well-rounded tool cabinet for such a class: Diagonal side-cutting pliers, at approximately $2.25 each ($25/doz.); 4" x 1/8" screwdrivers, 35c each ($3.80/doz.); knives, $1.50 each, ($15/doz.); and a hex-nut driver set which sells for $5. These are all small, easy-to-store tools. Probably your shop already has some of the tools just mentioned. How about the diagonal and needle-nose side-cutting pliers? Or the screwdrivers? You may have them and thus save part of the expense of this important new project.

And now for the factor which was once considered the most objectionable part of a course in radio—the cost of



Typical instruments needed for a radio shop are shown here. The tube-tester (not essential) and vacuum tube volt-ohmmeter are shown mounted in a wall panel. On the table, left to right, are an oscilloscope, an r-f signal generator and another vacuum tube volt-ohmmeter, all built in class.

materials. One of the methods to teach radio is to have the students build a simple superheterodyne receiver. The problem of cost can be solved in several ways: (1) Have enough parts on hand to build the radios (can be bought from a wholesale house). (2) Have the students choose from among several choices of receivers in kit form. (3) Have enough of one choice of receiver in kit form available to all students. The first method would probably be the least expensive; the third would be the most simple, at least for a start.

If the third procedure is chosen, the instructor can proceed in one of two ways. He can have each student buy a set outright; or if student can't afford this, he can have them build receivers from kits, and at the end of the course disassemble each set and save the parts for the next class.

A good five-tube superheterodyne set in kit form and with complete instructions sells for $14. A full dozen would cost only $168. This initial outlay would represent the main expense because either the student buys his set or disassembles one for the next class.

Other miscellaneous materials, such as wire and solder, are also necessary. But since radio kits are complete and ready to assemble, these added supplies are necessary only if the kit is torn down and rebuilt. The cost for miscellaneous material should not exceed $20 per 12-student class.

So there you have it . . . the necessary equipment for a course in radio. In comparison to the $800—$1000 lathe mentioned earlier, an entire radio course would cost only around half as much. True, this equipment represents minimum essentials. But students would be obtaining experience in an area not previously taught.

Cost of maintaining this radio shop is also small. Equipment and tools seldom need be replaced, unless they are "borrowed" or damaged. Radio kits won't need to be replaced after the initial outlay, except for the worn, damaged, or lost parts on sets that are rebuilt year after year.

Storage space for all equipment, tools, and materials needed requires just one or two corners of any shop. Unless the instructor wants to keep a large supply of radio kits on hand, storage problems are the minor ones.

Your program can be made more complete with a relatively inexpensive electronics setup such as this. Such a course will truly benefit students, the school, and the community.

So there's the way to do it. Now wade right in. ★

We can never relax our vigilance in

Safe Work Habits

By Arthur A. Dick

Supervisor, Vocational Education and Industrial Arts, Baltimore County Public Schools, Towson, Maryland

RECENTLY, a 15-year-old boy was literally snatched bald when he used a drill press improperly in a neighbor's home shop and got his hair caught in the rotating drill.

Why did this happen? He violated two safety rules. He was watching the work too closely; he wore his hair long and the front part dropped into his eyes and was snatched up by the spinning drill. The accident happened so quickly that the boy didn't realize he had lost his hair . . . didn't even notice the accompanying scalp lacerations until later. Fortunately, some of his hair may grow back.

Safety precautions that must always be followed when using a drill press can never be emphasized too much. Check your shop practices against this list to make sure your students are protected as they work.

1. Wear hair short or use cap. Roll sleeves.

2. Do not wear tie or tuck tie in shirt. Use bow tie.

3. Do not lean over too close to spindle or work; stand erect at your work if possible.

4. Wipe or brush drill-press table clean of oil and metal chips.

5. Check drill for sharpness and centering; see that it is securely seated and tightened in the chuck. Remove key from chuck.

Check these points before commencing work:

1. Is the work ready for drilling?

2. Are the drill revolutions per minute correct for the job?

3. How about the use of a drill-press vise? Clamps? Jig?

4. Is there enough light?

5. Does the drilling operation call for use of a lubricant?

6. Should goggles or face shield be used to protect the eyes?

Correct safety habits, practiced so they become second nature, WILL prevent accidents. But if an accident should occur it should be reported immediately and then should be followed up in writing, preferably on a form provided for this purpose. (Forms are available from School and College Division, National Safety Council, 425 N. Michigan, Chicago, Illinois.) Every accident should be investigated for there is always a cause—whether it is an unsafe act or as a result of a mechanical or physical hazard.

Eternal vigilance is needed by all concerned in all phases of safety. The safe way is simply the right way; it is an important part of good and effective teaching. ★

Called "developmental demonstration," it teaches pupils to

Think a Problem Through

By Clyde E. Burns

Education Specialist, I.C.A., Department of State, Karachi, Pakistan; formerly Head, Industrial-Arts Education, Florida State University

TRADITIONALLY, industrial-arts teachers have depended on the demonstration as a means of conveying information to their pupils. The teacher demonstrates how a job should be done, asks those who do not understand to raise their hands and when no hands appear, considers his lesson well taught.

But unfortunately, a youth wants to display his intelligence, not his ignorance. He may not have understood the demonstration . . . but his hand seldom appears. Since a pupil learns for himself, at his own rate, and usually as a result of some personally challenging problem-situation, the teacher must help the pupil in the learning process, not supplant the process with prepackaged information contained in the demonstration.

What is the difference between the developmental demonstration and the traditional demonstration? Two or three examples may illustrate this difference. Suppose a pupil is confronted with the problem of smoothing the end grain on a board. The teacher might show the approved procedure of planing part way across from the two edges of the board, using a block plane. He might show the dangers of planing toward an edge. Generally, pupils are passive in this instructional procedure, and the uninterested pupil—the one who sees no need for present application of the information—gains very little.

Where It Starts

The developmental demonstration does not start with the known fact or skill, but begins in the situation confronting the pupil and attempts to reorganize his previous experiences in terms of a present situation. The reorganization process, guided by the teacher, seeks to reveal the place of new information. Through activity on the part of pupils, principles involved are discovered. In the case of the board and the problem of a smooth end grain, the board would be placed in a vise and suggestions called for. Such ideas as sanding, using a wood file or rasp, and planing with various planes would be presented. Pupils making the suggestions would be given an opportunity to show results of their proposals and the class would evaluate each method in terms of time, effectiveness, effort, and result. If splintering of an edge resulted from planing all the way across, the reason of the mishap would be analyzed, and changed procedures discovered. The entire demonstration would be actively participated in by pupils, and principles known at the start by the teacher would have been developed by pupils through his skillful guidance. End results are that the pupil not only possesses the information, but he now understands how the information was derived. Retention of knowledge for later use has thus been materially increased.

Another example to illustrate the difference between the two types of demonstrations involves the setting of a jointer. One problem in such adjustment is the regulation of height for the back table. The conventional demonstration starts with the principle that the table must be set with the arc of the knives.

The developmental demonstration starts with the situation involving an adjustable table and a consideration of results if the table is high, low, or even with the cutting arc. Setting the table too high clearly shows the blocking of work by the back table's leading edge as work is fed over knives. Setting the table too low and running a piece of stock over the knives shows lack of support for the cut surface, the drop when approximately half of the stock has been jointed, the resulting gapped cut and inaccuracy of the edge. The obvious answer which all of the class will be able to see and understand is the necessity for setting the table tangent with the cutting arc of the knives. Also apparent is the reason for dropping the table slightly below the cutting arc and bringing it up to support the end of a trial-cut piece of stock. Here again the pupil finally knows the facts as well as the process by which the facts evolved.

Not all information can be presented safely to pupils by the developmental approach with actual equipment under actual working conditions. Modification of the situation makes it possible to derive the principles in safety. For instance, the danger of leaky fittings on an acetylene tank *could* be illustrated by striking a spark near the leak and blowing up the equipment. A much more practical and less hazardous demonstration is to show the generation of acetylene gas from carbide and water in a covered can with a nail hole and to ignite the gas, thus showing explosive factors on a smaller scale. The mere telling of the danger lacks the dramatic qualities of this developmental approach.

Use of the developmental demonstration is more efficient than the conventional techniques because the need for repeating the information to a pupil when he finally reaches the point where he needs it is greatly reduced. A teacher does not save much time in the long run if he has to repeat a demonstration to individuals or to small groups of pupils a half-dozen or more times, rather than take more time at the first and develop the information as pupils are able to comprehend the facts. The pupil must be the one who does the thinking and makes the discovery of knowledge for himself if learning is to be most effective. The teacher gives direction to the process by aiding the pupil in an analysis of the situation and the goal.

Test of Effectiveness

Final test of the effectiveness of instructional techniques might be the extent to which the teacher is concerned with the pupil's reactions to a problem rather than concern for the problem itself. The developmental demonstration aims at emphasis on the process of learning, rather than on the facts to be learned. By such changed emphasis, even the facts themselves are more meaningful and have greater applicability in subsequent situations.

Developmental demonstrations give opportunities for a pupil to display his intelligence. They are positive in approach, geared to the pupil, his concerns and rate of learning, and fit naturally into the techniques employed by teachers sensitive to the development of youth through their development of projects. ★

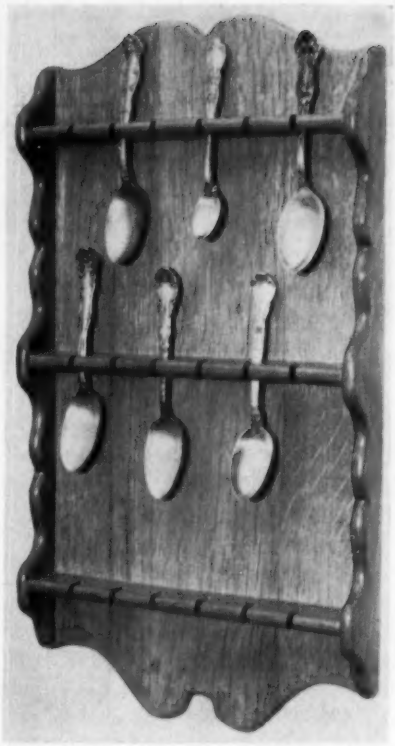


Photo by Glenn Cummings

From a discarded table-leaf comes this handsome

Spoon Rack

By Alvin R. Lappin

Assistant Professor of Industrial Arts, Los Angeles, California, State College of Applied Arts and Sciences

SOUVENIR spoons can best be displayed on this handsome spoon rack, a welcome take-home project. The rack is one of a pair patterned after early American furniture, and made from an old discarded oak table-leaf. It is especially well-adapted to senior-high-school machine woodworking.

Many facets of woodworking are utilized in this project. It helps develop the student's ability to make full-size patterns, accomplish layout work; and use the circular saw, planer, jointer, band saw, drill press, and router-shaper. In addition, it illustrates how strength and good appearance is made possible through proper construction. Tenon-dado joints fasten shelves to sides, and rabbet-groove joints join back to sides, without the use of a single metal fastener.

Here is the procedure to follow:

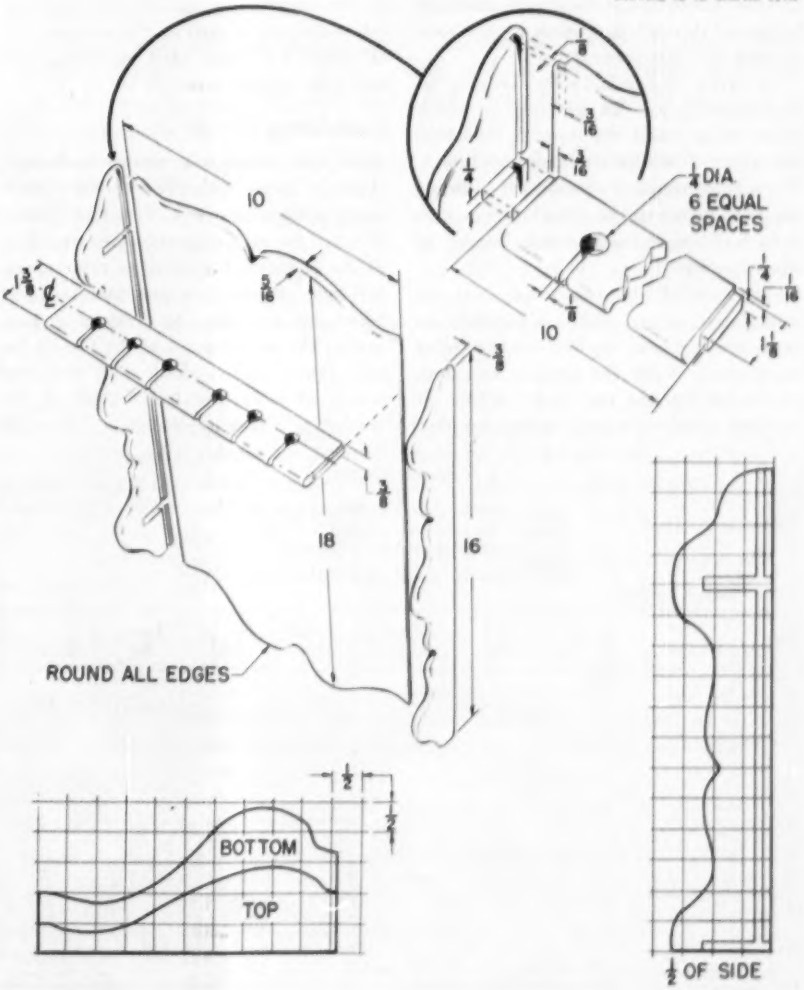
Develop full-size patterns from the reduced illustrations; select stock and reduce to proper dimensions as listed in the bill of materials; scrape and sand to remove machine marks; trace patterns on stock; lay out and cut stopped dadoes and groove on each side piece, rabbet on edges of back piece, and tenons on ends of spoon holders; band saw and smooth all edges of sides and back; lay out and drill holes in spoon-holder parts; round off edges of sides and front edges of back by use of router-shaper or hand-tool processes; cut slots from front edge of spoon holders to holes; clean and fit all joints by use of hand tools and sand all parts.

To assemble:

Lay one side flat on the bench and apply glue to dadoes and groove; insert spoon-holder parts; apply glue to back edges of spoon-holder parts; insert rabbet of back into groove of side containing spoon-holder parts; repeat same procedure for tenon-dado and rabbet-groove joints of opposite side; clamp all parts in place; when joints are dry, remove any excess glue, sand lightly, and apply appropriate finish.

Materials needed include two sides, $\frac{3}{8}$" x $1\frac{3}{4}$" x 16"; three spoon holders, $\frac{3}{8}$" x $1\frac{3}{8}$" x 10"; one back, 5/16" x 10" x 18". ★

Drawing by A. Charles Tyler



For accurate records in the machine shop here are two

Administrative Aids

By Michael Strosky
George Washington Trade School,
Detroit, Michigan

IN the administration of a school shop, a teacher oftentimes has difficulty in maintaining a clear, accurate record of the student's time accumulated on different machines, a means for routing work, and a method of keeping a record of the stage of completion of the work being done. These were some of the reasons which led me to devise the job ticket and the cumulative record system shown here.

I had an additional reason for devising these records with my students at George Washington Trade School, Detroit. When students at our school complete their shopwork they receive a "Trade Certificate," on which there is a list of the experiences they have had in the shop as well as the time spent on each. A cumulative record showing the operations the student performed as he moved through the course is necessary to keep this list accurate.

In order to facilitate the keeping of this record, a job ticket is used on which there is recorded the number of hours the student works on each operation. From this job ticket the number of hours are transferred to the cumulative record, thus building up a complete record of his experience.

The use of the job ticket and the cumulative record makes it possible for both teacher and student to determine at a glance what the student has done and what he has yet to do. When the student graduates and enters employment he carries with him an authoritative statement of the experiences he has had. This provides his employer with information which enables him to place the new worker on the type of job for which he has received the proper preparation.

Job Ticket

The job ticket shown below is given to the student when he is assigned to a new job. On this job ticket the student signs his name, the operation to be performed, and the date started. At the end of the day, entries record the total hours spent on the operation, the number of pieces completed, and by whom they were inspected. A grade also is issued. At weekly intervals the total hours and grade on the job ticket are transferred to the cumulative record. A different colored pencil is used so that the amount of work for each card marking can easily be figured out.

Cumulative Record

On the cumulative record each machine is listed with the various operations performed on it. The total hours of work for each operation are recorded in the squares. Included in this record are shop organization and maintenance, which are necessary to every shop program. The information at the top of the cumulative record along with the total hours of work are transferred to the student's "Trade Certificate." ★

A sample job ticket

George Washington Trade School
13000 Dequindre, Detroit 12, Mich.
Detroit Board of Education

JOB TICKET FOR MACHINE SHOP

Job:

Name	Operation	Date Started	Total Hrs.	No. of Pcs.	Insp. By	Grade

George Washington Trade School
13000 Dequindre, Detroit 12, Michigan
Detroit Board of Education

MACHINE SHOP CUMULATIVE RECORD

Name

Date Enrolled ..... Unit .....
Attendance:
Days Absent ..... Days Tardy .....
Attitude and
Cooperation ..... Work Habits .....

	Hours	Total
Lathe		
Facing		
Centering		
Rough Turning		
Finish Turning		
Knurling		
Taper Turning		
Drilling		
Boring		
Polishing		
Radius Turning		
External Threading		
Internal Threading		
Bench		
Layout		
Saw Stock (Hand or Power)		
Filing		
Hand Tapping		
Hand Threading		
Hand Reaming		
Fit and Assemble Work		
Bend Stock Cold		
Stamp Metal		
Scrape Flat Surfaces		
	Total	

	Hours	Total
Drill Press		
Plain Drilling		
Precision Drilling		
Countersinking		
Counterboring		
Machine Reaming		
Drill Grinding		
Milling Machine		
Plain Milling		
Vertical Milling		
Slab Milling		
Straddle Milling		
Sawing		
Indexing		
Spur Gears		
Shaper		
Planing		
Squaring Work		
Irregular Shapes		
Grinders		
Surface Grinding		
Cylindrical Grinding		
Taper Grinding		
Tool Cutter Grinding		
Miscellaneous		
Shop Organization		
Maintenance		
	Total	

Report Card Marks

First					
Second					
Third					
Final					

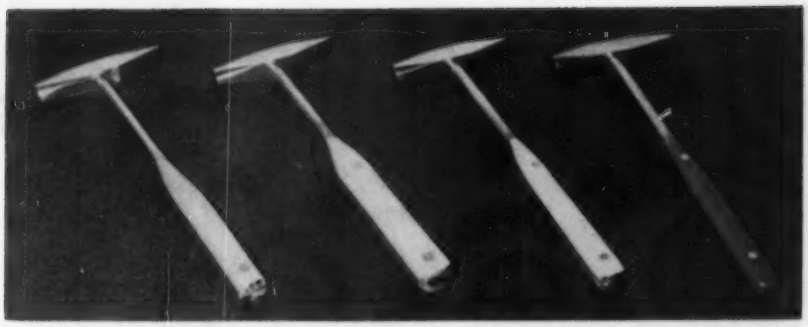
Front and rear view of the cumulative record.

Students like this

Forged Tack Hammer

By Amos G. Williams

Head, Industrial Arts Department, Southeast Missouri State College, Cape Girardeau



Many operations can be learned when making these forged tack hammers with wooden handles.

THIS project is designed to enable the student to make a useful tool while learning many of the fundamental processes in metal work.

Here are some of the opportunities for learning with this project: selection of materials, dyeing metal for layout, layout of pattern on metal, cutting with hacksaw, selection and use of drill bits, use of metal lathe, filing, forging, use of tap and die in making inside and outside threads, cleaning metal, polishing metal, and putting a lacquer finish on metal.

Steps of Procedure

Head:

1. Select stock for head and saw to rough length of 3 13/16".

2. Layout bevel and center for drilling.

3. Make bevel cuts with hacksaw and file to rough finish.

4. Center punch and drill hole with 5/16" drill bit.

5. Instructor should demonstrate centering of material in four-jaw chuck and facing, as well as setting compound to cut conical taper before student performs operations.

6. Select tap and thread inside hole.

Shank:

1. Select 3/8" mild steel stock and cut to rough length of 9½".

2. Layout with steel rule and scratch awl for forging.

3. Heat stock for forging to red color. Don't make taper too abrupt on shank.

4. Layout and drill holes for rivets. Use center punch.

5. Rough finish stock and prepare end of shank for threading.

6. Select die and thread shank to pass through head and allow for bradding.

Handle:

1. Cut stock and plane surface to fit against metal shank.

2. Layout and cut handle to shape.

3. Locate centers for holes and then drill and countersink holes.

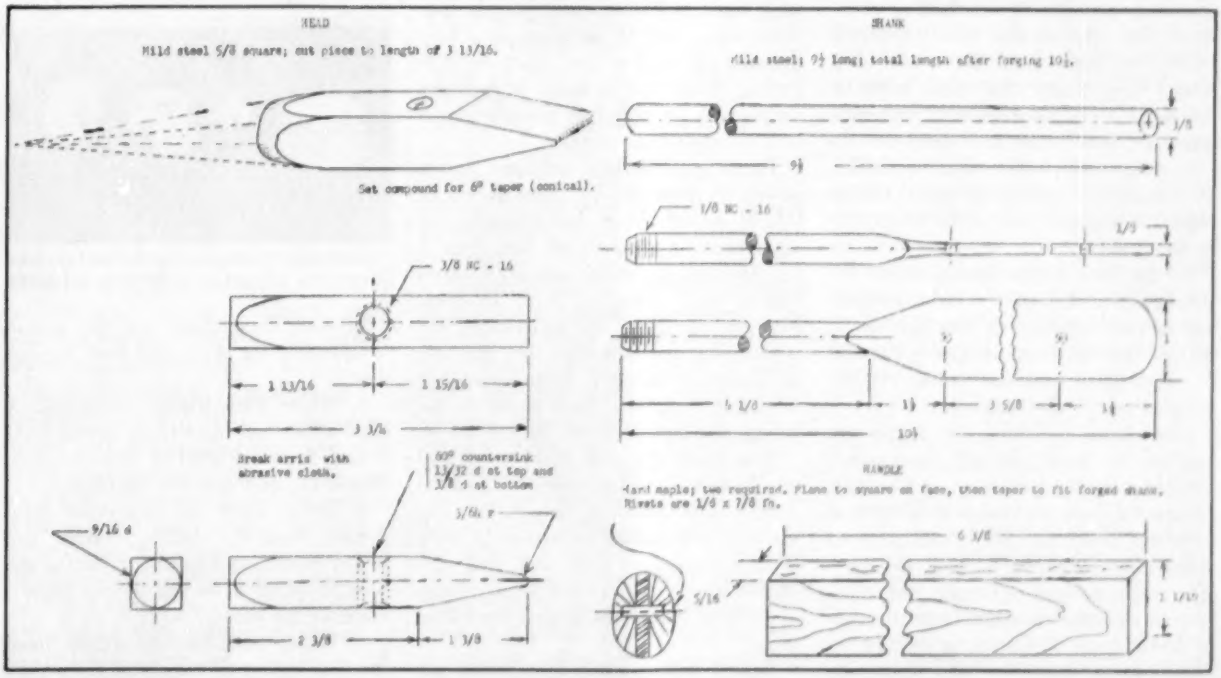
4. Work handle to snug fit on shank. Round arris for desired shape.

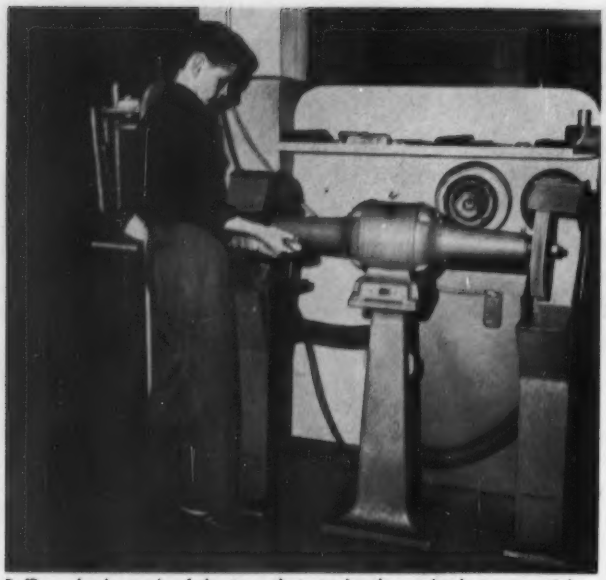
Assembly:

1. Assemble head and shank. Draw file and use abrasive cloth and oil to give mirror-like polish. (Use covers on vise jaws.)

2. Rivet handle to shank and sand handle. Polish all surfaces again.

3. After cleaning all surfaces, apply lacquer. ★





Buffing wheel guards of the type that can be thrown back are essential to safe operation. Stance and position of the hands should be watched, also.

Here's advice from an expert on

Polishing and Buffing

By Maurice Overholt

Flint, Michigan, Junior College

TECHNICAL advances in the field of buffing and polishing metals unfortunately do not include a source of ready-reference material on procedure. Supply houses list such a variety of compounds that the average customer gets thoroughly confused as to which material would be his best bet when trying to place an order.

After consulting with J. C. Miller, Division of Hanson-Van Winkle-Munning Company, Grand Rapids, Michigan, suppliers and manufacturers of electroplating, polishing, and buffing materials, and spending many hours with their buffing engineer, explaining school-shop polishing and buffing problems, five compounds were produced, which we think meet the needs of a school shop which uses many types of metals. I have used these compounds now for four years and they can do jobs faster and better than the makeshift methods I previously used. I hope other instructors can profit from our experiments.

To go back to the fundamentals, we polish and buff metals to enhance their appearance whether or not this is to be the final finish or whether we intend to electroplate another metal on the polished and buffed surface.

The term polishing is frequently applied to three distinct processes—flexible grinding, polishing, and buffing. In general, industry makes a distinction between polishing and buffing, even though this might be a debatable question with modern methods and compounds designed to apply better finishes at lower costs. Polishing is usually referred to as a process of brightening metal surfaces by means of a somewhat flexible or resilient shell coated with abrasives. Its purpose is chiefly appearance.

Buffing also is a process using abrasives and flexible wheels, but it is distinguished from polishing by the fact that abrasives are fed on the wheel during the operation, whereas on the polishing wheel the abrasive agent is glued to the wheel before use. Wheels used in buffing usually are made of muslin discs and the abrasive is usually finer than No. 220. Grain sizes in polishing vary from 120 to 220.

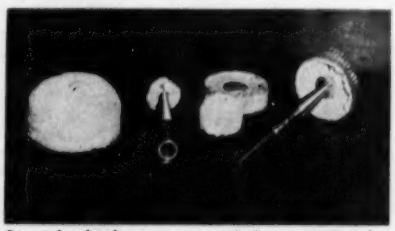
Polishing is used as a final finish on such items as kitchenware, shovels, machine tools, and, in addition, as a preliminary operation for most buffing. Buffing is used to produce high luster on items to be plated or already plated and on nonferrous metals.

To do good buffing, sufficient horsepower is required. We have limits to this in school shops, but I would not recommend a buffer with less than 1 hp. The best speed for general-purpose buffing and polishing is 1750 rpm. Built-up wheels are not satisfactory for school shop use, although they are still used some in industry. Aluminum-oxide belts that run on a back stand or the rubber tire and sleeve do the job better.

Two types of wheels, loose and sewed muslin buffs, are necessary for general buffing and polishing work. If shop teachers will contact industries in their local communities they will find discarded wheels that are still large enough to do most of the jobs around the school shop.

School buffing equipment would not be complete without some special wheels for certain jobs. A tapered buffing spindle can be mounted on the shaft of a small ¼-hp motor or fitted with a tapered center and used in a wood lathe. Closed-end buffs are known as goblet buffs and can be purchased in diameters from 2″ to 4″. Theses are ideal for buffing the inside of small trays and bowls.

Greaseless compound almost takes the place of the built-up wheel for school-shop use. The greaseless compound can be obtained in grain sizes from 120 to 400. In our shop we use 2550 Miller containing 220-grain size. It can be applied directly to the wheel, left to dry 45 seconds with the wheel running, and it's ready to use. Wrap the compound in a plastic bag when not in use to keep the end damp.



Special wheels are essential for certain jobs. Closed-end buffs are ideal for trays and bowls.

In our shop, these are the grease compounds we stock and how we use them:

1. Miller 1924 tripoli compound. A good all-around fast-cutting grease compound. It can be used on brass, copper, aluminum, and zinc die castings.

2. Miller 5230 cut and color compound. Used for buffing copper and nickel plating and good for putting the final finish on brass and copper objects made in the shop.

3. Miller 8318 chrome rouge. Good for final buffing on aluminum for a high,

lustrous finish. It is necessary to buff chrome plating and it also works well on steel for high-gloss finishes.

4. Miller 9775 stainless steel compound. It is a fast-cutting compound for all types of steels. It also works well on aluminum.

Numbers used here can be translated in equivalent compounds by any manufacturer or supplier of plating materials in your area. Other possible sources are: Devine Bros., 220 Seward Ave., Utica, New York; Hanson-Van Winkle-Munning Co., Matawan, N. J.; Lea Manufacturing Co., 16 Cherry Ave., Waterbury 86, Conn.; Charles F. L'Hommedieu and Sons Co., 4521 Ogden Ave., Chicago 23, Ill.

Keep in mind, always, that buffing and polishing operations are very dangerous for the inexperienced person. Here are a few good safety rules.

Stance at the wheel is very important, but difficult to describe. The individual should stand close to the wheel, feet firm, and the head should be out of line with the revolving wheel. Hands should be held close to the body with the piece gripped firmly. Buffing should be done from the center of the wheel and below, thus the piece, if caught on the buffer, will always be carried away from the operator. It is a good idea to look over the way the piece is being held to make sure that fingers are not interlocked so that if the piece is caught in the buffer, the operator's hands would be unable to slip free. It is not recommended that anyone attempt to buff or polish without first having been instructed on the proper methods.

Other safety precautions include: wearing nonshattering safety goggles; never attempting to buff small parts without a jig or holder (rings on a tapered dowel, etc.); always buffing *over* or with an edge, never to the edge; never buffing sharp objects such as knives; never wearing any loose clothing around the buffer (unbuttoned sleeves, jackets, ties, outside shirttails); never bending over the wheel to pick up parts as loose hair can be caught; never standing near a buffer when it is turning unless you are working on it.

When polishing or buffing a part it is standard procedure to work around the facets and indentations first and then work down the main areas. In the case of a tube, the two ends should be done first and the main area next. Buffing wheels should be used with one type of compound (grease or greaseless) only and should be cleaned frequently by combing with a comb purchased or made for this purpose. ★

Several fundamentals of electronics can be learned by making a

Visual Interval Timer

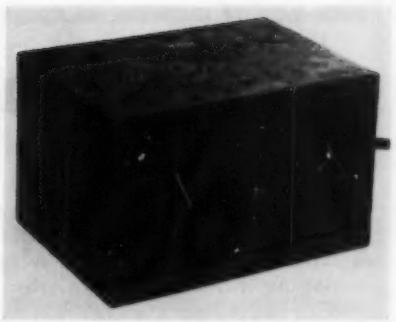
By Rupert N. Evans

Associate Professor of Industrial Education, University of Illinois, Urbana

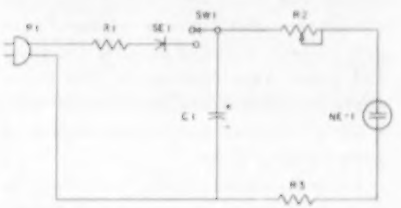
MANY games, such as chess, checkers, and the word contests which have recently come into popular favor, are played with a time limit for each contestant. This tends to speed up these games and make them more popular with many players. Some sort of device for indicating the amount of time between plays is obviously desirable. Unfortunately, most interval timers are expensive, delicate, or not easily adjustable for small intervals of time.

The timer described here is relatively inexpensive, trouble-free, and accurate. It has the further advantage that, as the time limit approaches, the neon bulb glows more and more faintly until it is finally extinguished. Operation is simple. The timer is plugged into an ordinary 117-v, a-c outlet, the switch is depressed momentarily, and the timing begins as soon as the switch is released. The time interval is adjusted by potentiometer R_3. If desired, R_3 can be calibrated in terms of minutes and seconds, but it is usually satisfactory merely to adjust this potentiometer to a time which is mutually agreeable to both players. From then on, each time the switch is depressed and released, an equal amount of time is allotted to each contestant.

The principle of operation is quite simple but is relatively important in the study of electricity and electronics, since many control circuits operate in essentially this same manner. When SW_1 is closed, current flows through R_1, a current-limiting resistor, through SE_1, a half-wave selenium rectifier, and charges C_1, a large capacitor. Current flow in the opposite direction is prevented by the half-wave rectifier, so C_1 is charged to its full voltage in a very short time. When SW_1 is released, the current flows through R_3, NE_1, and R_2 until the voltage drops below the value needed to continue the ignition of NE_1. R_3 is variable and controls the intensity with which NE_1 glows and also regulates the amount of time for the discharge of C_1. R_2 is a current-limiting resistor which prevents too much current from flowing through R_3. The larger the values of R_2 and R_3, the longer the neon bulb will remain lighted. If R_3 has a resistance much lower than 10,000 ohms, the potentiometer R_3 may be damaged.



The neon tube in the center of the cabinet glows more faintly as the time limit approaches. One switch controls timing, the other, current.



Schematic diagram of the visual interval timer.

The timing interval is most affected by the value of C_1. Unfortunately, as C_1 is increased in capacity, it also increases rather rapidly in cost. If a time interval of more than three minutes is desired, it may be most economical to purchase two or more 300 MFD capacitors and wire them in parallel.

The original model of this timer has been in use for over a year with no repairs. It was built into a 4″x3″x3″ cabinet constructed of plywood and masonite painted black. The circuit is not at all critical since it operates at 60 cycles per second, and a smaller cabinet can be used if desired. Naturally, the cost of this unit can be considerably decreased by using junk box parts. ★

Parts List

C_1—300 mfd, 125 w.v. electrolytic capacitor	$1.65
NE_1—Neon lamp, ¼ watt	.09
R_1—47 ohm, ⅛ watt	.10
R_2—1 or 2 megohm potentiometer	.73
R_3—10K to 1 megohm, ⅛ watt	.10
SE_1—35-50 m.a., selenium rectifier	.58
SW_1—Pushbutton or rotary switch, SPST, normally open	.59
Approximate price total	$3.84

From power mowers to motor scooters, we're now living in

The "Putt-Putt" Era

By Warren F. Haas
Arsenal Technical Schools, Indianapolis, Indiana

THE time is ripe for establishing a unit of instruction in school shops covering the maintenance and overhaul of small air-cooled gasoline engines. Power lawn mowers, outboard motors, sprayers, chain saws, garden tractors, pumps, and a myriad other uses of small engines has made them almost universal equipment. But the era of the "putt-putt," which makes it possible for more and more Americans to do jobs themselves with less effort, has brought with it the problem of keeping the engine in good running order.

In Indianapolis alone, according to the Chamber of Commerce, residents owned 33,650 power mowers in 1953. This figure increased to 43,900 in 1954. Figure this on a national average and you'll see the real need for a unit of instruction in school shops which covers small air-cooled engines.

The course can easily be adapted to a six-week or nine-week section of a general shop program. In a unit shop, the course can be expanded to include a semester's work. Length of the course can be varied, determined by local needs, according to the amount of theory and technical information to be offered. If the unit is to be used as a finding course for auto mechanics, then the theory of carburetion, ignition, and two- and four-cycle engine operation should be covered.

Motivation for the boys is already there, for many of them have observed their fathers, trying to start the power mower, with little luck or know-how.

Cost of a shop program covering small-engine overhaul is surprisingly low. Engines are available through the Indiana State Surplus Program at $35.00 each. They can be purchased through regular wholesale outlets with a generous school discount. The community might also furnish engines for overhaul in the school shop, an excellent method of promoting school-community relations. Special tools are not required and floor space necessary for this program is small. Engine manufacturers will furnish the necessary instruction manuals to cover all phases of engine repair.

Here is a suggested course outline which can be adapted to meet your particular needs.

Part 1 should cover the principles of engine operation, including four- and two-cycle engines.

Part 2 should contain instruction on lubrication. Fuel systems should be taught in Part 3. Types of fuels systems (gravity feed and pressure feed) and carburetors should be included. Carburetors should be removed, disassembled and assembled, with special attention given to nomenclature, inspection of parts, cleaning of parts, carburetor adjustment, float adjustment, mixture adjustment, and rpm adjustment.

Part 4 should cover ignition systems, with methods of removing flywheels, and the theory of magneto operation being included. For the latter part, the instructor should emphasize the coil, condenser, contacts, magnets, nomenclature, testing of magnetos, assembling magnetos, magneto timing and adjustment. Spark plugs should be cleaned and adjusted.

Part 5 should contain instruction on engine overhaul. The head should be removed, cleaned, and inspected; valves should be removed, inspected, and ground; the pan should be removed; the rod and piston should be removed, grooves cleaned, and rings and rod bearings replaced; the crankshaft should be removed, inspected, and seals and bearings should be replaced; a crankshaft should be installed. At this time instruction can be given in valve timing, the inspection of the cam shaft, installation of rod and piston, replacement of pan and head, replacement of flywheel, carburetor, and gas tank. The engine should be mounted and started and necessary adjustments should be made.

Part 6 should include engine tune-up and trouble shooting should be covered in Part 7. ★

Editor's note: Instructional materials such as service and operation manuals, 16mm films; information on design and principles of 2- and 4-cycle motors, and trouble-shooting sequences may be obtained free of charge. Write the following companies asking for the list of materials they have.

Clinton Machine Company, Maquoketa, Iowa
Attn: Bud McKinsey
Cushman Motor Works, Inc., Lincoln, Nebr.
Attn: O. J. Wisbey
Power Products Corporation, Grafton, Wisconsin
Attn: M. B. Ruege

By learning the fundamentals of operation of a two- or four-cycle engine, these youngsters will have a valuable skill, helpful in our machine age.

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"Texts Tailored to Teach"

Bolivia . . . . . *from page 9*

When the Bolivian government asked SCIDE to come to the aid of these schools, we began by securing necessary equipment, particularly metal-working machines. The Pedro Domingo Murillo master school in La Paz was in an old home, and the projected new building had come practically to a standstill. Funds were provided by the SCIDE for completing and equipping the new school as one of the first steps and by the time this article appears, we hope to be in our new building.

But more important than this material help was aid in teaching techniques. The first step was the selection of five members of the faculty of Pedro Domingo Murillo for a year's training in industrial schools in the United States plus experience in industry itself. These men are back at their posts and four more men are now in the United States taking the training made possible through U. S. government grants, a vital part of our educational program.

Faculty members return with improved skills in actual shop work and teaching methods and with a recognition of the role played by industrial schools in the life of the country. These U. S.-trained teachers back us up in deemphasizing the education of specialists in Pedro Domingo Murillo and in changing the curriculum to the training of skilled workers.

In my job, I work through the school faculties in the development of teaching techniques. A foreign technician has to proceed tactfully in any country, but fortunately, I have an excellent counterpart in Juan Pereira, now being groomed to take my place as director of SCIDE's Division of Industrial Education. A graduate electrical engineer, he has had experience in industry as part owner of a small ceramics factory in La Paz, and has had a year of industrial education in the United States, with emphasis on the placement of workers. I might point out that each of the U. S. technicians in this educational program has a Bolivian counterpart. The North American helps the South American grow into his own job.

Juan and I have a pet project underway at the moment, an experiment in shop management which we are conducting in one of the machine shops of the Pedro Domingo Murillo school. Two shifts of 15 senior boys are assigned to this machine shop and are given responsibilities they must shoulder as workmen in industry. This sounds extremely simple in the telling, but it represents a great departure from methods which have prevailed.

We have made each student responsible for the care and maintenance of his machine. We have met the perennial problem of the disappearance of tools by making a tool crib from a small closet at the back of the room. The cubicle was once anybody's territory, but we cut the door in two parts, and put a shelf in the middle. All of our students were intrigued with the new cow door, though we haven't a name for it in Spanish. A student who wishes a tool now applies to the keeper of the crib who charges him with what he takes out, according to his number. Students take turns at managing this tool crib, and at the end of each session, the one in charge must have all tools back before the class is dismissed.

The instructor acts as shop foreman and keeps a record on each student. A boy's card shows the nature of each job given him, the amount of time he took to complete it, and the instructor's evaluation of his work. Students thus get a taste of being judged on their performance just as they will be judged when they work in industry. Since one of our big tasks is to bring about a close relationship with industry so that management will seek our students and keep us advised of what they need, these complete records give us the knowledge

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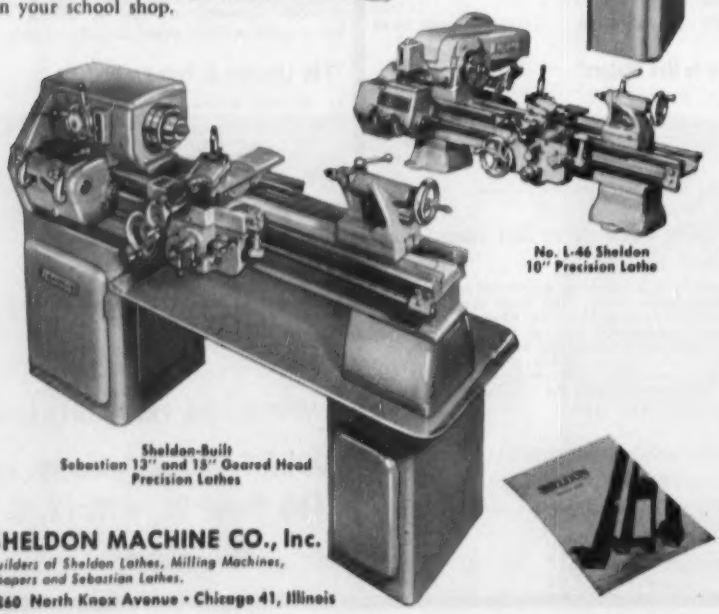
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of our boys as workmen in order for us to build up our placement service.

Overcrowding would completely nullify the example we are setting, thus we have had to be very strict about admitting too many students to our classes. Machines are well separated and around each is a red line marking the safety zone inside which only the student and instructor should be found. At the back of the machine room is the first-aid kit, standard equipment in every modern shop. We are training students to assume responsibility for health and safety practices, and have arranged for a series of lectures by Holden B. McClung, a U. S. engineer, who directs the new occupational health program in Bolivia.

"Sweeping up" at the end of the day represents perhaps the greatest psychological change in the pupils. Wielding a broom is something you just don't ask boys to do in Bolivia, but these youngsters do it willingly, accepting the task as a part of their responsibility in maintaining a good shop.

The ingenuity of these youngsters is an endless source of surprise and pleasure for me. This ingenuity is all the more important in this country which has to import steel and other materials. An instructor was recently showing off a bench vise which a student had made from an old automobile spring. It was hand forged and handmade and an excellent piece of work.

Students are constantly responding to instruction and accepting their obligations, in fact, often they are so engrossed in their work they do not hear the final bell. During the long holiday of Holy Week, I stopped by the shop and found that every machine had been greased and the place was in perfect order. Since our modest experiment caused a few raised eyebrows in the school, I am naturally very gratified at the way it has caught on.

We are careful not to supplant the Bolivian ways of doing things in our teaching techniques. Sometimes their manner of handling a tool is different from methods we follow at home, but that's beside the point. The Bolivian operates a hand saw in reverse, to me, at any rate, and I must say it looks odd. But to them it's not a reverse way of sawing, but the right way, and the board gets sawed just as well one way as the other.

It is the hope of SCIDE that all of the technical advice and other assistance will be of benefit in building up the industrial economy of Bolivia in the years to come. ★

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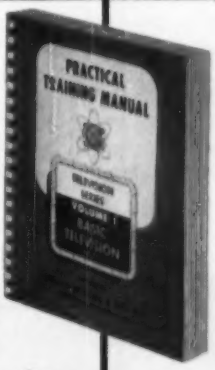

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Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

No Plus Ultra MICHAEL FLAHERTY is a good egg—which is saying a lot for a fellow whose ancestors plagued the British government for so many years. He is intelligent too—notwithstanding the fact that he is a shop teacher. Because of his excellent qualities he is rated high by his supervisor, who, by the way, is not given to praising his teachers unless he finds them unusually successful in their work.

And why does Mike rate the approval of his superior? The answer is simple. In the first place Mike loves children and understands why they behave as they do. He encourages unusual ability and has unlimited patience with those pupils who encounter difficulty in their work.

He is friendly with his pupils, but he is firm in maintaining good discipline. He never scolds, as he believes that young people, when they are in error, can be shown that when they misbehave their actions affect other members of the class adversely. Because of this he reasons with them and brings them to the realization that they are not playing the game according to the rules, and that anyone who does this is a poor sport.

Mike is a careful organizer. He has each lesson well planned so that every pupil can understand what the problem is that the teacher is discussing. Moreover, they are given a clear picture of what they are supposed to do, with the result that they proceed with their work with assurance.

He recognizes that pupils differ in their aptitude, in their interest, in their capacities, and in their ability to comprehend. Since he is aware of these differences, he considers them in his dealing with individual pupils. With this in mind he takes time to observe his class after each demonstration in order to discover those who appear not to have grasped the points made in the demonstration. By this means he is in a position to discover those who are in need of individual attention.

As an aid in his teaching, Mike maintains a comprehensive shop library of current printed material. He makes a practice of referring his pupils to these books and magazines as sources from which he is confident they can obtain the answers to the many questions they ask. In doing this he is encouraging the boys to read, and he is creating within them confidence in the value of the printed page as a source of information. Above all he is training them to attempt the solution of their own problems, rather than having them rely entirely on their teacher.

Mike keeps records of important matters which he believes will be helpful to his pupils, to himself, or to his supervisor. By this means he is in a position to discuss intelligently with parents the progress their child is making. He is able to tell a pupil that he is progressing satisfactorily, or that there is room for improvement in his work. Moreover, he can present the evidence on which his opinion is based. Not only so but, when the end of the year approaches, he can present an authoritative report to his supervisor on his equipment and supplies. He knows specifically what equipment needs to be repaired. He knows what replacements have to be made and why. And he can tell precisely what materials and supplies will be needed for next year.

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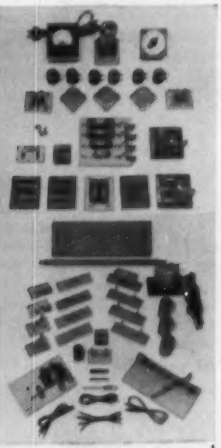

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... and many more

The Crow Electri-Kit for Beginners and the Crow Basic Electronics Kit have brought electricity and electronics into thousands of schools . . . schools where these subjects were long considered too difficult or too expensive to teach.

Now Crow brings you Model 53—a unique *Advanced Electronics* kit. This "learn-by-doing" kit gives your students penetrating insight into the fascinating world of Radio Transmitting and Receiving, Industrial Electronic Controls, Electron Tube Theory, and Basic Radar and TV.

With the kit's 108 components, students *build their own operating assemblies.* A correlated, 400-page work manual gives complete directions for assembly plus historical background and practical applications of each experiment. Written in simple language using only elementary mathematics, the manual permits teachers with limited technical training to teach the course easily.

Model 53 is the comprehensive, common-sense way to practical electronic knowledge, yet its cost is remarkably low. The complete kit as shown above—*nothing else to buy*—costs only $155. *Write for illustrated folder.*

CROW ELECTRI-CRAFT CORPORATION

Division of Universal Scientific Co., Inc. • Box 336R • Vincennes, Indiana

the machines, and the receptacle for 1" brads contains only—what do you guess?—yes, it contains what the label indicates, however unusual that may appear. In other words, everything in Mike's shop shows evidence of good management and careful attention to the details of teaching.

But, someone says, Mike cannot be that good. But he is, and he is typical of many shop teachers we have observed. And we can think of no logical reason why other teachers cannot be as good. All they have to do is to keep in mind that their function is to teach efficiently, be alert to new ideas as they appear, and attack their jobs as systematically as Mike does.

Again, the remark may be made that all this involves too much detail, while a teacher's job is to teach. But it should be kept in mind that all of the procedures that Mike follows are part of the teaching process. Mike does all of them, others do also; so, let it not be said that you cannot! ★

Here Is a Way . . .

to publicize your industrial-education program

Photography Workshop

A ONE-DAY photography workshop held annually in Tucson, Arizona, High School has proved to be good public relations for the school. The workshop is cosponsored by the graphic-arts department of the school, the Graflex Corporation, and the local newspaper, the *Tucson Daily Citizen.*

Harry A. Goldstein, instructor of photography at the school, points out that the workshop serves both the students and the community. In addition it brings to the school the professional photographers of the area who hire the students after they graduate. Last year 128 persons from all parts of Arizona attended the workshop.

Father and Son Projects

A FATHER and son exhibit of shop projects was recently sponsored by the industrial-arts department of Brooklyn Junior-High School 162 to promote better parent and school relationships.

The exhibit featured a display of student's crafts in conjunction with projects made by parents when they attended school. A photograph of the unusual exhibit later appeared on the school page of the *New York World-Telegram and Sun.* Thomas Dossie, chairman of the industrial-arts department, was in charge of preparing the exhibit.

Aids Parent Cooperation

To keep interest of his students in industrial drafting from waning, Walter P. Busch, industrial-drafting teacher at Woodrow Wilson Junior High School, San Diego, Calif., encourages parents to provide the boys with challenging reading material.

After Christmas vacation a letter from Busch goes out to the parents with suggestions for a home library which will give the student good guidance and stimulating material to draw ideas from. The book listings include prices.

Boys' Day in Industry

BOYS' DAY IN INDUSTRY has proved to be an excellent technique in promoting better school-community relations in Los Angeles, Calif.

The 1955 event, held in May, provided 1131 high-school senior boys with the opportunity to visit five newspapers and 51 industrial concerns. The boys served in honorary positions of leadership and observed routine operation of representative Los Angeles industrial plants.

B-G Presents—

CRAFT PROJECT UNITS

The units illustrated in this ad will provide creative interest for students in woodworking, plastics and metal working.

Imported Clock Movements

No. 905

60 MM

No. 905 ROUND ALARM
Polished brass case 2½" dia. x approx. 1⅛". Face of polished brass, legs detachable for flush case mounting. Price, each.....$3.90

60 MM BAROMETER MOVEMENT
This is a fine quality unit polished brass case 2⅜" square x approx. 1⅛" deep. Face is polished brass. Price, each.....$4.15

No. 155 ELECTRIC
Made in U. S. by Sessions. Attractive 4⅛" dia. face with brass rim. Movement fits 4" dia. hole. Depth approx. 1⅜", back detachable. Complete with cord and plug for 110 volt wall outlet. Price, each.....$4.75

No. 155

7-JEWEL DESK ALARM
Beautifully finished appearance. All parts highly polished brass. Base can be mounted or detached to suit project. Clock face 2½" x 1⅞". Back is round and fits 1 13/15" dia. hole. Depth approx. ⅝". Price, each.....$7.90

Desk

8-DAY MOVEMENT
Attractive 4½" dia. face with polished brass rim. Movement fits 4½" dia. hole. Depth approx. 1⅝", back detachable. Price, each.....$6.35

8-Day

Also Desk Set Parts and Music Box Movements

Write for new 1956 B-G Catalog

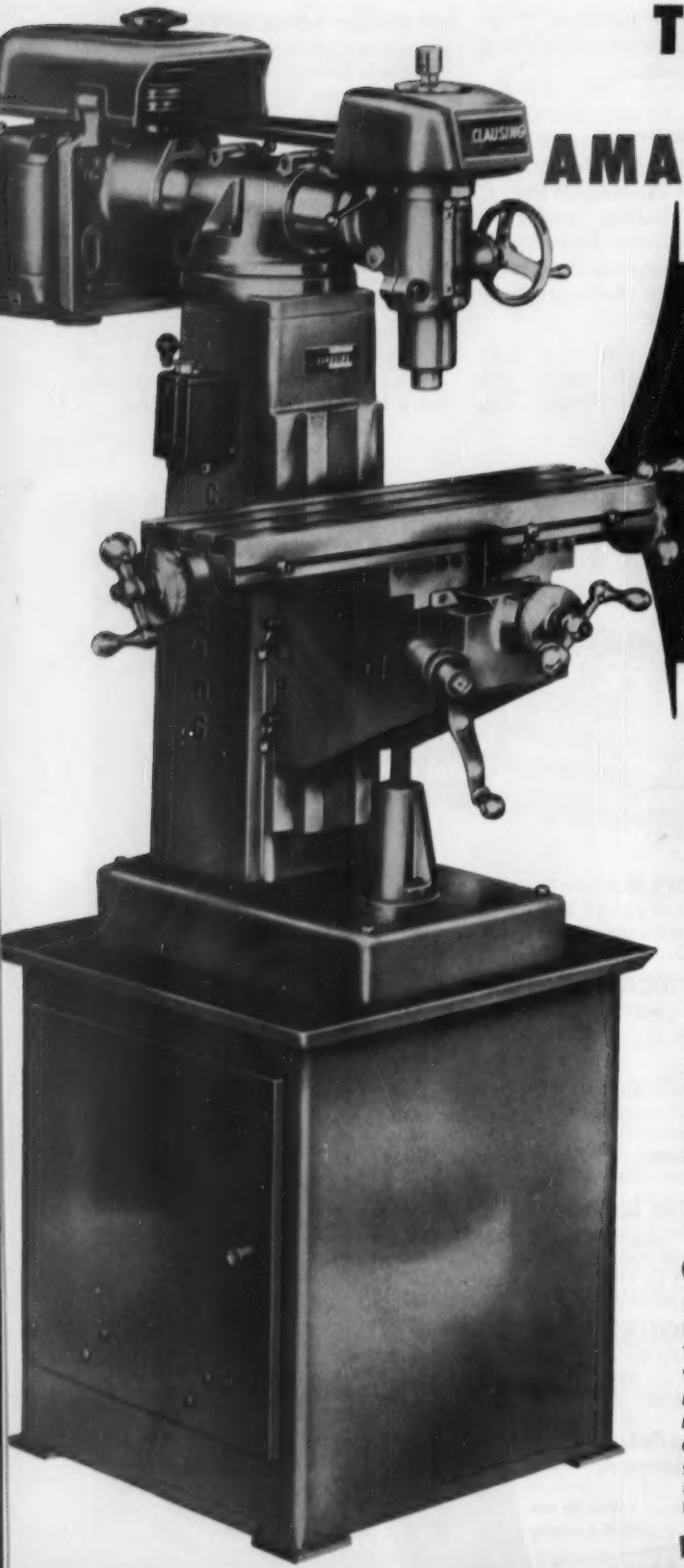
BRODHEAD GARRETT CO.

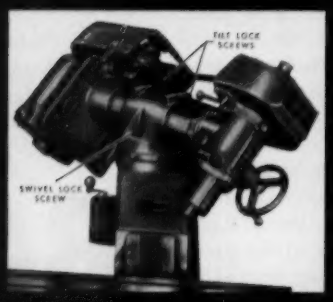
50 Years Serving School Shops of America

4560 E. 71 ST. CLEVELAND 5, OHIO

TEACH MORE BASIC

AMAZINGLY VERSATILE





The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to mill, drill, bore, ream and shape at all angles with one setup. Quill has micrometer depth control stop and two feeds, lever and hand wheel.

The CLAUSING Vertical Miller is a great new multi-purpose machine . . . it is ideal for modern school shop training. Spindle head can be swiveled in vertical plane, and set at any angle, and turret rotated in a horizontal plane making it possible to mill, drill, bore, ream and shape at all angles with one setup . . . it is actually *several* precision machines in one. In switching from one operation to another, the savings in setup time alone is a most valuable factor for teacher and student alike. Built to rigid tolerances for efficient operation and long accuracy life, it is a rugged, precision machine. There are 7 ball bearings in the CLAUSING heavy-duty drive. All feed screws have ground threads, turn on ball bearings. Table surfaces and dovetail ways on table, saddle, knee and column are precision ground.

Priced to be the most outstanding value in the miller field, this new CLAUSING is worthy of investigation by all school shop instructors and everyone who plays a part in the selection of school shop machinery. Your CLAUSING dealer will gladly give you complete information about the CLAUSING Miller . . . call him today, or write direct for illustrated literature.

CONDENSED SPECIFICATIONS

Size of Table	6" x 24"
Longitudinal Table Travel	15"
Transverse Table Travel	5"
Vertical Table Travel	11⅝"
Maximum Distance Spindle to Table	11⅝"
Maximum Distance Spindle to Column	8¾"
Quill Travel	3"

Spindle Speeds: Six, 180 to 3250 R.P.M. — No. 7 Brown and Sharpe or No. 2 Morse Taper Spindle, Optional — Operates from ½ or ¾ HP, 1725 R.P.M. Motor.

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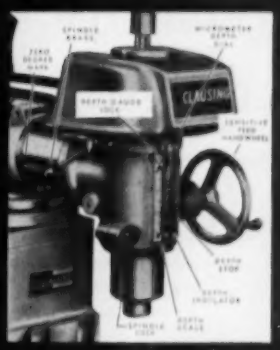
Atlas CLAUSING
PRECISION MACHINE TOOLS
DIVISION ATLAS PRESS COMPANY
KALAMAZOO, MICHIGAN, U.S.A.

the PLUS VALUE LINE

OPERATIONS BETTER . . . WITH THE
CLAUSING VERTICAL MILLER

Mills, Drills, Bores, Reams & Shapes . . . at all angles . . . with one work setup!

The Heart of the CLAUSING MILL is its rigid, high precision spindle head. It has 7 ball bearings — spindle is chrome nickel steel, hardened and ground — quill, ground and hard chrome plated, has full-length honed bearing seat — overarm is an electric furnace casting, with ¾" thick walls, precision ground.



BUILT FOR EXTREME ACCURACY

The CLAUSING Vertical Miller is the most accurate machine of its type and price! Before it leaves the factory each CLAUSING Miller must pass rigid tolerance tests — such as:

1. **Top of table perpendicular to column ways, both directions, within .0005" in 8" travel.**
2. **Table top, front to back, square with column ways 0 to .001".**
3. **Table, parallel to turret within .001".**
4. **Spindle square with table, front to rear, within .001" T.I.R. in 5" circle.**
5. **Spindle taper (internal) run out within .0002" at spindle nose.**
6. **Table T-slots parallel to table dovetail ways within .0005" in 8" longitudinal travel.**

And equally important . . . CLAUSING Millers are ruggedly built for standing up under inexpert student use — their quality construction will win commendation from those who expect you to buy tools for many years of dependable service.

CLAUSING 6300
12" LATHE

CLAUSING 18"
DRILL PRESS

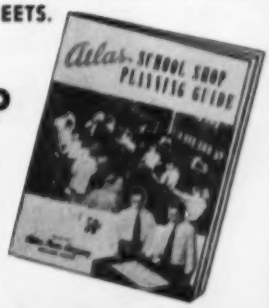
CLAUSING MACHINES MEET SCHOOL NEEDS BEST

There are many reasons why CLAUSING Vertical Mills, Lathes and Drill Presses meet school needs best. They set the standard for safety. Each has many exclusive, easy-operating features that enable students to learn machining principles *faster* . . . with less supervision. Their moderate prices enable you to buy more equipment per dollar invested . . . give more students the opportunity to get adequate operational experience.

When you plan your shop expansion or tool replacement programs, make sure you have the latest CLAUSING catalogs and Specification Sheets to guide you in determining your recommendations and requisitions.

Safety Sam Says: Write for FREE Safety Sam POSTERS, WALL CHARTS, LITERATURE, and SPECIFICATION SHEETS.

SCHOOL SHOP PLANNING GUIDE - 50¢
ONLY
(65¢ outside U.S.A.)



CLAUSING DIVISION

Atlas Press Company
Quality Machine Tools Since 1911
12-122 N. Pitcher St. • KALAMAZOO, MICH.

*strictly personal

JAMES W. KELLY, program specialist for the Pacific region in the trade-and industrial-education branch of the vocational-education division, U.S. Office of Education, has announced his retirement.

CHARLES A. BUNTEN and WALTER E. BURDETTE have been named to positions in the industrial-arts department of Ball State Teachers College, Muncie, Indiana.

ROBERT E. KUHL, formerly of the University of Minnesota, has gone to Washington State College where he will teach electricity, radio, electronics, and metals.

L. C. MCDOWELL is the new supervisor of industrial education, State Department of Education, Frankfort, Kentucky. H. D. NOE has succeeded him as coordinator of the Somerset, Kentucky, Vocational School.

Recently named chairman of the council on teacher education at Texas A & M College, College Station, is CHRIS H. GRONEMAN.

BERNARD S. PROCTOR has accepted the job of head, department of industrial education, Florida Agricultural and Mechanical University, Tallahassee.

ARTHUR JONES, teacher of handicrafts at the Wallingford Recreation Center, Wallingford, Berkshire, England, is an exchange teacher in the Lindenhurst, Long Island, N.Y., high school. He is exchanging positions with PALMER FRANCIS of the Lindenhurst school.

J. ALBERT OSTER, assistant supervisor of industrial education, Minnesota State Department of Education, has resigned. He will teach in the Minneapolis public schools.

EURUS STOLTZ has been named supervisor of trade and industrial education, Illinois State Board of Vocational Education.

C. A. PICKEL, supervisor and teacher of industrial arts in the Ponca City, Oklahoma, schools, has gone to Ethiopia where he will serve as director of Asmara Vocational Trade School, Asmara, Eritrea. HAROLD ROBERTS, formerly of Oklahoma City, was the school's first director and he goes to Addis Ababa, Ethiopia, where he will organize a similar program.

PAUL V. MCMORRIS has been named coordinator of industrial and vocational education in the Decatur, Illinois, public schools.

ROBERT W. TARBELL, vice-principal of Milwaukee, Wisconsin, Vocational and Adult School, retired recently.

LINDSAY VINSEL, trade- and industrial-education supervisor, Portland, Oregon, public schools, has accepted a position with the Medford public schools.

J. R. MULHOLLAND announced his retirement recently. He was director of industrial arts for Kanawha County schools, West Virginia. TALMAGE NICHOLS succeeds him.

LEE SMALLEY has joined the faculty of Michigan State Normal College, Ypsilanti, Michigan.

J. JACKSON TOWNSEND recently joined the West Virginia trade and industrial education staff as Assistant State Supervisor.

IRA JOHNSON is the new head of the industrial-arts department, State Teachers College, Mankato, Minnesota.

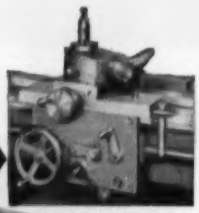
ROBERT M. KNOEBEL has been appointed state teacher-educator for trade and industrial education at Kansas State Teachers College, Pittsburg.

Recently retired is ROY CARVER, longtime director of the Stevens Point, Wisconsin, School of Vocational and Adult Education.

ALFRED REDDING has been named director of vocational education, Springfield, Illinois, public schools. He replaces RALPH MASON who has joined the faculty of the University of Illinois, Urbana.

L. J. LIPNEY has been appointed trade and industrial supervisor, vocational education department, Portland, Oregon, public schools. ★

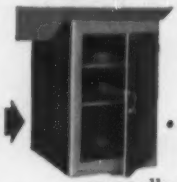
from its big ball-bearing spindle . . . .

. . . . to the precision carriage . . . . 

along its rugged, accurate bed . . . .

to the tailstock . .

. . . . and down to the variable speed drive . . .

and its solid, strong, convenient cabinet 

. . . . the No. 6560 Logan 14" Lathe is ruggedly proportioned, precision built and dynamically balanced. Its superiority is evident as it hogs the heavy cuts with almost no perceptible vibration, and produces precision results. Trains the student on an industrial lathe. At your Logan dealer's. Write for Bulletin 14-L.

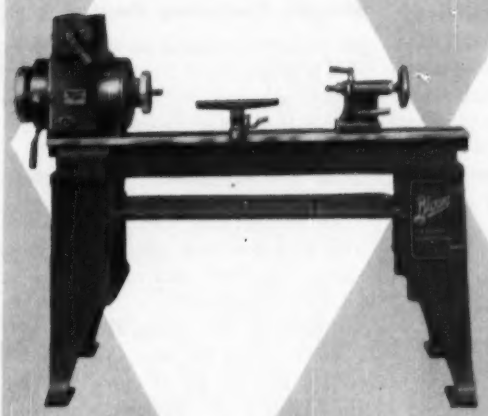
SPECIFICATIONS AND FEATURES

14⅛" swing over bed
9" swing over saddle
1⅜" spindle hole
1" collet capacity
40" between centers
Variable Speed Drive
Ball Bearing Spindle
38 to 1200 rpm

LOGAN ENGINEERING CO.
4901 WEST LAWRENCE AVENUE • CHICAGO 30, ILLINOIS

THE *Blount* UNIT TYPE MOTOR HEADSTOCK LATHE

WOOD TURNING
METAL SPINNING
METAL FINISHING
LAPPING AND CHUCKING

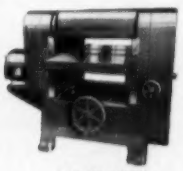


Here is 4-way operation for more versatility in the shop. A smooth performing, rugged, easy-to-operate lathe that can handle work with 12" swing quickly and safely. The Motor Headstock is unit type ½ horsepower standard spindle speeds provide 600 — 1200 — 1800 — 3600 R.P.M. by selector switch. Heavily constructed bed with scraped ways . . . standard bed lengths from 4" to 8". Cabinet type legs and wooden shelf provide safe tool storage (can be furnished for bench mounting). Operates on standard 220 volt, 3 phase, 60 cycle power, also supplied for 440 or 550 volts. Full accessories available.

Blount Pattern Makers' Lathe equipped with bed rack, hand feed carriage with compound rest and full set-over tailstock. Available in same bed lengths as Motor Head Lathe.

For complete information request Bulletin SD-17

J. G. *Blount* Company 21 Woodland St. Everett 49, Mass.



24" PLANER

20" PLANER

16" PLANER

12" PLANER

Model 15
CHAIN MORTISER

Model 5
HOLLOW CHISEL MORTISER

Model 50
6" JOINTER

FOR THE MODERN SCHOOL SHOP

Heavy Duty Woodworking Machinery designed for years of trouble free service. Especially constructed to withstand the rugged use of the School Shop.

Ease of operation, accuracy and extra safety features make these machines ideal for student operation.

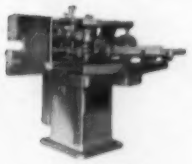
Priced well within the range of School funds.

Complete information sent upon request

Manufactured by

POWERMATIC MACHINE CO.

McMINNVILLE, TENNESSEE



TENONER

Model 10
HOLLOW CHISEL

Model 60
8" JOINTER

KINKS

Payment will be made for each Kink published. Send to Editor, School Shop, Ann Arbor, Mich.

Double Duty for Fuse Boxes

Usually, the surface of the steel panel boxes for fuses mounted on the walls of most shops is wasted wall space. However, with small Alnico magnets used as anchors, safety posters or other bulletin-board information can be displayed here.

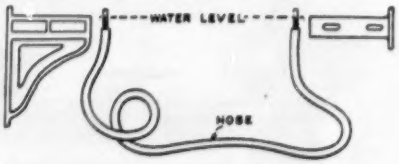
These magnets can be picked up as surplus items in magnetic TV tube deflection yokes or purchased at a very reasonable price.—*Carl H. Hubachek, Branford, Connecticut, High School.*

Three Months of Safety

One of the first projects my graphic-arts classes undertake is the making of a combination safety-first poster and three-month calendar. This year we used a huge ear at the top with the caption, "Stop, Look, and Listen." The calendar months of October, November, and December appear at the bottom of the poster and the imprint of our graphic-arts club and the words "Safety First" are below that. These posters are hung in each room and serve a useful purpose as well as displaying the students' handiwork.

For this particular job, we used a light piece of blue cardboard and imprinted the ear in a darker blue, the safety captions in red, and the calendars in black.—*Ben Taubenfeld, Junior High School 71, Manhattan, New York.*

Simple Leveling Device



An efficient level can be easily made with a garden hose. Slip ordinary gage glasses into each end of the hose and fill with enough water so the water level will show in each glass, as indicated.

When filling the hose with water be certain that all air is out of the hose. Hold it in a "U" position when filling and do not attempt to fill it by immersing the hose in a tub of water. Also, water in the hose must be the same temperature. If water in one end is warmer it will occupy greater volume and the level will not be true. With this device you will get accurate results.—*W. F. Schaphorst, Newark, N. J.*

Easy Storage Rack

A rack similar to the ones used to store phonograph records can be adapted as a handy storage place for circular saw blades. Build your rack to accommodate the dado head and construct a slotted rack which will display and store your saws in an upright position with the teeth facing toward you. Saws can then be removed or replaced in short order. Be sure the arbor wrench is handy, too. — *Don Kinnaman, Junior High School, Rocky River, Ohio.*

Save Steps When Sawing

This combination scrap box and lumber support is a handy item to have around. The small pieces of cut-off stock that gather around the circular saw are

NEW
GREAVES
TOOLMAKERS
OVERARM

Here's the way to add new "firepower" to toolroom milling operations! Install in your toolroom a GREAVES MILL equipped with this new Toolmakers Overarm.

You'll discover new versatility for milling intricate jig and fixture work, for keywaying, slotting and angular milling. Two graduated swivels permit mounting the spindle head in almost any angle for milling, drilling, spot facing and related operations.

Powered by an independent 2 HP motor, the unit is driven through helical gears. Eight speeds may be selected with convenient controls operating speed change clutches. A hand-fed quill attachment provides 4" tool travel to the spindle. Arbor support fits overarm, permits arbor type milling without changing overarm.

Write for Complete Specifications and Prices

- Swivels permit any angular setting of spindle head.
- 2 HP independent motor drive.
- 8 speeds from 175 to 1750 RPM.
- Quill has 4" hand feed.
- Spindle equipped with No. 50 N. S. taper; reduced to No. 2 Morse taper when Quill Attachment is used.
- Gears run in oil bath.
- Full vision oil level gauge.

RACK FEED. The overarm is equipped with rack feed for positioning over work.

GREAVES MACHINE TOOL DIVISION
J. A. FAY & EGAN COMPANY
2300 Eastern Avenue, Cincinnati 2, Ohio

Manufacturers of
GREAVES MILLS
"the MOST Mill for the LEAST Money!"

caught by the scrap box at the end of the saw table. The box is on casters and may be moved out a few feet from the saw so it can be used as a support for ripping long stock.

Since the roller on top of the box is set ¼" lower than the saw table, short stock will clear the roller when the box is near the saw yet a 3' or longer piece rests on it when the cut is finished.

On the side of the saw stand is an auxiliary tool board which holds accessories that are changed frequently. This saves many steps over to the regular tool panel on the wall.—*Robert S. Tupper, Canton, South Dakota, High School.*

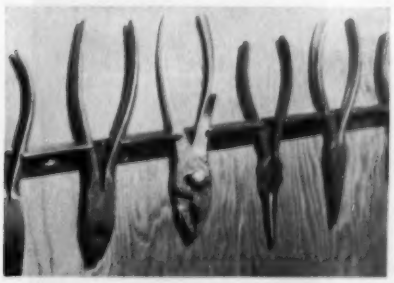
Chilling Does It

Sometimes aluminum castings such as skillets and ash trays are spoiled because cracks, holes, and paper-thin areas have developed in the bottom of the project. This is usually because of too rapid cooling of the metal in the top part of the sprue hole and risers, causing a draw in the still molten sections of the casting as the cooler metal shrinks.

To prevent drawing, a chill must be employed.

If a frying pan is being cast, for example, a flat, round, piece of steel with dabbers attached to one side is placed on top of the bottom of the pattern when sand is being rammed into the flask. The chill is left in the mold when the pattern is lifted. When the metal is poured, the first part of the casting to solidify will be the center portion of the bottom since the chill or flat piece of steel will produce rapid cooling. The thicker the chill, the quicker the cooling. —*Louis Enos, Lincoln Junior High School, Sacramento, Calif.*

Hang Them Up



Electrician's pliers, so-called gas pliers, long-nose pliers, etc., cause a storage problem in an industrial-arts shop. This simple mounting will provide universal storage space for nearly all types.

Use ¾x¾x⅛ angle iron. Drill two ½" holes on ⅞" centers. Cut into the holes as pictured and file out the small "triangular" shaped portion remaining. —*Ira H. Johnson, State Teachers College, Mankato, Minn.*

In the Groove

After an error in drawing has been erased, ink sometimes runs or spreads on the paper as you work on the corrected portion.

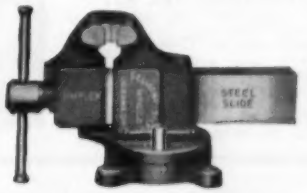
To prevent this, draw a pencil line over the part you intend to re-ink. The pencil line has a tendency to keep the ink in a groove when the ruling or lettering pen is used. Lettering is easier, too, and not so fuzzy.

On colored illustration paper having a blotter-like surface, ink can be confined if wide enough pencil lines are made before inking.—*Charles Green, Middlesex County Vocational and Technical High School, New Brunswick, N. J.*

Wanted—Teaching Kinks

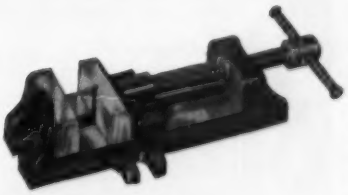
SHOP teachers are urged to send in brief descriptions of kinks and short cuts which they have found helpful in their shop. Send to the Editor, SCHOOL SHOP, Ann Arbor, Michigan. Payment will be made for each kink published.

the complete line of quality vises for school shops



machinists vise

woodworkers' vise



drill press and milling machine vise

utility vise

Vises are not all alike. There are definite reasons why Desmond-Simplex vises, even though they cost no more, give more value.

For example, in the machinists' line, Desmond-Simplex's exclusive steel slide has been proven unbreakable in service in industry.

Ten models and types of woodworking vises, strongly constructed for all school requirements. Also drill press and milling machine vises and utility vises in several sizes.

Write for copy of our new vise catalog and name of your nearest distributor.

THE COMPLETE LINE OF QUALITY VISES FOR SCHOOL SHOPS

Desmond-Simplex

THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Heathkits PROVIDE "LEARN-BY-DOING" EXPERIENCE

IN THE CLASSROOM AND SHOP

Heathkit BROADCAST BAND RECEIVER KIT

Covers 550 to 1600 kc and features miniature tubes, 5½" PM speaker, and built-in antenna. Cabinet available.

MODEL BR-2 $17.50

Ship. Wt. 10 lbs. (Less Cabinet)

Heathkit VACUUM TUBE VOLTMETER KIT

Features 7 DC ranges, 7 AC (RMS and peak-to-peak) ranges, and 7 ohmmeter ranges. 4½" 200 ua meter—11 megohm input impedance—1% resistors—etched-metal circuit board—attractive styling.

MODEL V-7A $24.50

Ship. Wt. 7 lbs.

Heathkit ETCHED CIRCUIT OSCILLOSCOPE KIT

3" oscilloscope using etched metal circuit boards. Light and compact—easily portable. Features extended sweep range and broad amplifier response. Push-pull vertical and horizontal amplifiers. A tremendous dollar value.

MODEL OL-1 $29.50

Ship. Wt. 14 lbs.

Heathkit manuals provide step-by-step assembly instructions, pictorial diagrams, schematic diagrams, information on color codes, on soldering, and regarding tools. High quality parts supplied in every kit.

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Full Schedule Ahead for AVA Visitors

The average industrial-arts or trade- and industrial-education man visiting Atlantic City for the 1955 American Vocational Association Convention, scheduled Dec. 5-9 at Haddon Hall, will find very little time on his hands.

A jam-crammed, interesting schedule includes six student speakers who represent trade- and industrial-education clubs and industrial-arts students. Educational TV will be discussed in a special session with emphasis being given to television for industrial arts, and a session on the place of drafting and planning and a session on project design and selection are also on the roster.

In addition to the six student speakers, other speakers at the general sessions will include Billie Davis, author of *I Was a Hobo Kid*, and Arthur Motley, president of *Parade*, a nationally-circulated magazine.

In the trade- and industrial-education section, special speakers will include J. F. Sieger, Ford Motor Co.; Nate Weinberg, UAW-CIO; Winifred Holmes, U.S. Department of Labor; and John Furbay, Trans-World Airlines, Inc. Lawrence Borosage is chairman for this section.

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The Parks No. 20. 20" Planer has a 4-knife cutterhead with a speed of 3600 R. P. M. and offers two feed speeds—20 and 40 F. P. M., and 40 and 80 F. P. M. Will take work up to 20" wide by 6" thick. Ruggedly built for vibrationless operation.

The Parks Heavy-Duty 12" x 4" Planer. A compact, sturdy thickness planer that offers mill planer precision at low price. Has feed speed of 16 F. P. M. at 4000 R. P. M. Will handle material as short as 6" and as thin as 1/16".

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IN THE *Morning Mail..*

[Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Dear Sirs:

I am an industrial-arts teacher from the British West Indies, but am at present pursuing a course of training in Puerto Rico. I wish to congratulate you on the good work you are doing with this publication. A few copies were handed to me by the director of industrial education in C. R. and I think you're doing a very good job. Keep it up!

St. Clair U. Walwyn,
Rio Piedras,
Puerto Rico

Dear Sirs:

Enclosed is a little news item. (The item states that Harry A. Goldstein became the only teacher in the United States to be elected an associate in the Photography Society of America and was recently awarded the Society's Service Commendation, an honor given to only one person in the nation each year.)

I will send any of your readers a copy of our course of study in photography if they will send me a selfaddressed envelope.

Harry A. Goldstein,
Tucson Senior High School,
Tucson, Arizona

Dear Sirs:

I would like to take this means of commending you for the wonderful service provided by SCHOOL SHOP to the shop teachers throughout the country.

Our regional director in industrial arts and vocational education, Byron Keller, recommended SCHOOL SHOP to the teachers at our county institute three years ago. I have been receiving the magazine since that time and have found it to be a very fine source of information on various subjects of interest to a shop teacher.

I look forward to receiving this magazine more than any of the other magazines that I receive and I have never yet been disappointed. Let me thank you again for this wonderful service.

John D. Williams,
Mauch Chunk Township High School,
Nesquehoning, Pa.

Dear Sirs:

There has been little attention given to the social position of industrial arts in the school curriculum. In many of our schools throughout America, the instructor is still considered a "Mr. Fix-It," or "the shop teacher." In some cases he is assigned the more unruly pupils and expected to keep order until the bell rings! Generally speaking, academic instructors still do not look on industrial-arts men as persons with professional standing equal to their own.

Why? We must consider the history of industrial education. Forty years ago when industrial education was born the average teacher was not the polished and professional man he is today. Educational leaders were not tuned to the purposes and aims of the program in its original stage and often misunderstood its goal and objectives. In their eagerness, industrial-arts teachers *did* mend school furniture, etc. From these acts of kindness and cooperation grew the stigma of "janitor," and "Mr. Fix-It." While still not entirely removed, the stigma has lessened in recent years.

What have the industrial-arts teachers done to help themselves? Have they actively participated in other teacher organizations *outside* their own field? Have they made known the elaborate college training program which they successfully completed? Do the academic teachers realize that the industrial-arts teachers' "lab" hours while in college often exceed those of the academic teachers? Are others of the faculty aware of the responsibility vested in the industrial-arts teachers (with pupils using power tools, etc.) for pupil safety? Do they know the amount of capital investment necessary to a good industrial-arts program? Most of the answers to these questions are in the negative.

When the industrial-arts instructor himself takes time to objectively evaluate these issues, he will see that only he as an individual faculty member can change the picture. We cannot depend on our own local or national associations for help. Perhaps they can advise and help plan corrective action, but basically, it is up to each industrial-arts teacher to ascend to his rightful professional position. And when a few of our men achieve that position of academic respect, the entire field will be elevated too!

J. Dailey

Dear Sirs:

Regarding the three Valle brothers teaching in the Baltimore, Maryland, schools, I'm happy to advise Stanley J. Pawelek that we have the "Hills" in Hartford, Connecticut. Gordon is general-shop instructor at Dominick Burns School (8th grade school), and Howard is a woodworking instructor at Weaver High School. I can assure you they are on top.

Walter F. McAndrews,
Industrial-Arts Supervisor,
Hartford, Connecticut

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Dear Sirs:

You and your staff are to be congratulated on the fine work you are doing on SCHOOL SHOP magazine.

As a coincidence, we have been planning a shavings-collection system for over a year and now have one installed. It has been hard to get information on such a system or manufacturers of equipment, yet had we waited until your October, 1955, issue came out, we would have had the names of several manufacturers. Incidentally, our system is all we could ask of it. Keep up the good work.

William F. Johnson,
Frederic, Wisconsin, High School

Dear Sirs:

Enclosed are several requests for information from your October issue. I appreciate very much the service which you offer to shop teachers. Thank you for this service and for your magazine.

R. Y. Eckels,
Austin Senior High School,
Houston, Texas

Dear Sirs:

Thank you for a fine magazine. The services, articles, and projects in SCHOOL SHOP have been very much appreciated. The boys in my shop have made many projects from ideas that were in your magazine. I have used many of the ideas that were put forth in articles in SCHOOL SHOP and have found them very successful.

Robert Morris,
Tony, Wisconsin, High School

Dear Sirs:

While teaching seventh-grade boys the correct names of common hand tools, I included the familiar 6" adjustable wrench manufactured by a well-known company and stressed the fact that it was correctly called an *adjustable* wrench. Sure enough, on the final tool identification examination one of the boys answered the question as *just a pull* wrench.

On another examination paper in the same class, one lad wrote that the correct direction of the piston movement in each of the strokes of the four-stroke cycle was *north, south, east,* and *west.*

Then there was the boy who missed out on his definitions pertaining to terms used in the printing shop. In answer to the question, "What is a composing stick?" he wrote the following: "A composing stick is the kind of a stick waved by our music director when he leads the orchestra."

Garfield Burnham,
Liberty, New York, High School

TWO NEW Starrett® PRODUCTS of special interest to school shops

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THE L. S. STARRETT COMPANY, ATHOL, MASSACHUSETTS, U. S. A.

Dear Sirs:

Here is a poem written by Holly Gosnell, an 8A student in home-mechanics class at Sterrett School. I thought other teachers might enjoy it.

WHAT I THINK OF SHOP

Dear Mr. Ivy, the course was swell,
Even though I can't work with wood very well.
I really do think you've attached every link,
From wiring a plug to fixing a sink.
I really was rather proud of myself,
When I saw my lamp, sitting there on the shelf.
Fixing appliance plugs, attaching with screws,
Were things that I learned (plus inserting a fuse.)
I doubt you will try to remember and cherish
The days we girls pestered you, 'til you wished you would perish!
In my opinion, I wish we could do,
All those same things over again with you.
I think I have learned lots of things from your classes,
I wish there were more, but, oh! how time passes.
But when you look 'round, see the dent in the bench,
Remember, I learned how to handle a wrench.
And when you see the hole in the floor,
You'll know that your lessons taught me to bore.
Whenever you think you suffered consequences,
When you see my initials carved deep in your benches,
Remember I learned how to handle a knife,
And I'll never forget it the rest of my life.
To sum up this poem,
Which has logic and jest,
I hope you'll not think I've been such a pest.
But now as I finish, Mr. Ivy, you're great,
In my book of patient people, first place you will rate.

Reginald A. Ivy,
Sterrett School,
Pittsburgh, Pa.

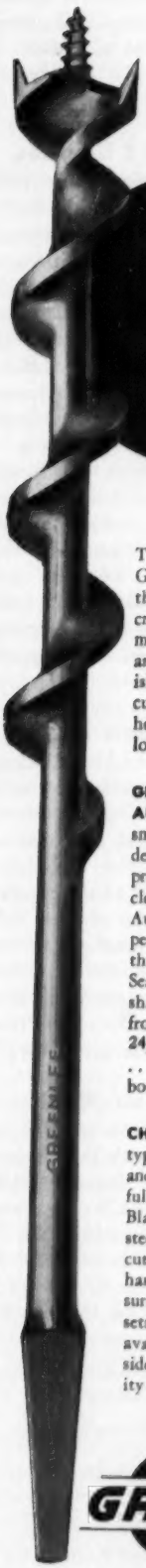
Dear Sirs:

I wish to take advantage of the Shop Teachers' Service feature of your very interesting and helpful magazine. You perform a distinct service to all industrial-arts and vocational-education teachers.

Charles Reichle, Jr.,
Norwood, Ohio, High School

high-quality tools by Greenlee

for accurate shopwork



The minute you take hold of a GREENLEE tool, you can "feel" the fine quality and extra craftsmanship that go into its making. All GREENLEE tools are carefully formed and finished for accuracy and correct cutting edges. All are properly heat-treated for strength and long life.

GREENLEE 22 SOLID-CENTER AUGER BITS bore *accurate* holes smoothly, quickly. Solid-center design gives extra strength and provides fast, positive chip clearance. Every GREENLEE 22 Auger Bit has accurately sized, perfect cutting edges that last through long use. "Plastic Sealed" to reach you factory-sharp. Available in 18 sizes: from 4/16" diameter through **24/16".** Buy singly or in sets . . . in handy plastic rolls, steel boxes, or metal holding panels.

CHISELS, GOUGES, Various types of tang butt, socket butt and firmer chisels. All are carefully balanced, easy to hold. Blades are of selected tool steel that long retains its fine-cutting edge. Green plastic handle provides comfortable, sure grip. Buy singly or in sets. GREENLEE socket gouges available with inside and outside bevels . . . same top quality as all GREENLEE tools.

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METAL CUTTING BAND SAW

Wet cutting system shown is an optional extra. Casters available for easy portability.

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Now you can get the larger capacity you've been looking for in a Quality Built, Moderately Priced horizontal metal cutting band saw. Designed and built by Wells Manufacturing Corporation to give you BIG Value and OUTSTANDING Performance, the New Model 600 is the answer to metal cutting for medium and small production jobs, general utility, or tool and stock room work.

Big capacity—6" pipe—is only part of the story. The Model 600 offers Wells Quality throughout. A few of these features are listed below. The combination of these features makes it possible to do a better job of cutting at a lower unit cost.

Set up a Model 600 in your shop. Put it to the test—You'll see metal cutting at its best.

Call your Wells Distributor for all the details, or write for descriptive information.

SELECT FEATURES

- Exclusive Wells "constant-load," foolproof blade tensioning.
- Safety Switch with thermal overload protection and automatic stop features.
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SPECIFICATIONS

CAPACITY:	
Rectangular	6" x 13"
Rounds	6¾" dia. x 6" pipe
45° angle	5" x 5"
SPEEDS, ft. per min.	50, 90, 160, 250
BLADE SIZE	⅝" x .032 x 8' 2½"
MOTOR	½ H.P.
WIDTH OF BED	8½"
FLOOR TO TOP OF BED	25½"
FLOOR SPACE	21" x 50"
SHIPPING WEIGHT, approximate	375 lbs.
with coolant	425 lbs.

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happenings in industrial education

Stout Workshop

INDUSTRIAL-ARTS teachers from several states attended the annual industrial-arts workshop at Stout State College, Menomonie, Wis., on October 21. Purpose of the meeting was to provide instructors with an opportunity to view and perform latest processes in five areas of industrial arts.

Leaders of the panel discussions and demonstrations included Ray Kranzusch, of Stout State College, and Mr. Jentzen of Sax Brothers, leatherwork; George Soderberg of Stout State College, general finishing; Philip Buehl, also of Stout College, electronics; Lovern Nauss of Austin, Minn., metal tooling; and John A. Jarvis of Stout College, shop management.

Herbert Anderson, head of the woodworking department at Stout, was chairman of the workshop.

IA Conference in Buffalo

"CREATIVE Craftsmanship" was the theme of the annual Western New York Industrial-Arts Conference held October 28 at the New York State College for Teachers at Buffalo.

Glenn A. Wagner, author and lecturer, presented an illustrated talk on "Craftsmanship in Action" as one of the features of the conference. Walter Dorenburger, missile design consultant for the Bell Aircraft Corporation, Niagara Falls, also spoke on "From Guided Missiles to Space Ships."

Discussions and demonstrations in the areas of ceramics, graphic arts, metals, wood, and shop planning were held during the afternoon. Taking part in these discussions were leaders from industry and the Buffalo college as well as students from the College of Ceramics at Alfred, N. Y.

An exhibit of work from the New York State Craftsman Guild was on display during the conference.

New Vocational Building

THE new vocational-arts building at Nebraska State Teachers College, Kearney, was dedicated on September 30. The dedication address was given by Verne C. Fryklund, president of Stout State College, Menomonie, Wis., who spoke on the subject, "Only Free People Can Be Educated."

The new vocational-arts building, which had been in the planning stage for more than 15 years, houses the home-economics, industrial-arts, and commerce departments. Otto C. Olsen is head of the vocational-arts division of the college.

Indians Take T & I Courses

SEVEN Menominee Indians this year have registered in trade and industry courses in Oshkosh, Wis., in a special government effort to assist them in learning a trade. The courses selected include radio and TV servicing, auto mechanics, sheetmetal, welding, and cabinet making.

The educational program for Indians, financed by the federal government, provides for fees, instructors, and subsistence for the enrolee. It is the aim of sponsors of the program that special training will enable the Indians to find employment and be in position to enter normal life in their communities. This program of education was developed following federal legislation that provides for termination of federal services to several Indian tribes including the Menominees of Wisconsin.

Florida Assn. Elects

ELECTED president of the Florida Trade and Industrial Education Association at a recent meeting in Tallahassee was Amos C. Rivell of West Palm Beach. He succeeds James Gaylor of Palatka.

Other officers elected at the meeting were Hazel McKeon, also of West Palm Beach, secretary-treasurer; Carroll Persbacker, Tampa, Nelson Donnell, Pensacola, Everett Moak, Tampa, W. F. Monroe, Orlando, and Ann Burnette, Pensacola, all vice-presidents.

Printing Education Week

PRINTING Education Week will be observed in connection with International Printing Week, from January 15-21. John M. Fontana of the A. S. Somers Junior-High School, Brooklyn, N. Y., has been reappointed chairman of the Printing Education Week Committee by the International Graphic Arts Education Association.

Convention Calendar

American Vocational Association, Atlantic City, N.J., Dec. 5-9.

California Industrial Education Association, Bakersfield, March 16-17.

Illinois Vocational Association, Pere Marquette Hotel, Peoria, March 22-24.

New York Vocational and Practical Arts Association, Hotel New Yorker, New York City, April 12-14.

Missouri Spring Conference on Industrial and Distributive Education, University of Missouri, April 20-21.

American Industrial Arts Association, Milwaukee, Wis., April 23-28.

The program for the week will be planned around the theme "Benjamin Franklin, a Heritage for Americans." January 17, 1956, will mark the 250th anniversary of Benjamin Franklin's birth.

New Fraternity Chapter

THE first resident chapter of Iota Lambda Sigma in Texas was installed recently at Texas A & M College.

William L. Powell was named first president of the new Chi Chapter. Carl C. Livesay was elected vice-president, and Dennis M. Heitkamp was named secretary-treasurer. Leslie V. Hawkins, associate professor of industrial education at the college, is the faculty advisor.

David H. Morgan, president of Texas A & M College, was made the chapter's first honorary member.

Nebraska Convention

CECIL E. STANLEY, president of the American Vocational Association and assistant commissioner for vocational education in the Nebraska State Department of Education, gave the address at the annual convention of the Nebraska Vocational Association in Grand Island on October 1. He spoke on "Vocational Education Tomorrow."

A tour of the new high school at Grand Island and a discussion of "Physical Facilities and Teaching Aids" featured the afternoon session.

Einer Toft, Grand Island, was the convention chairman.

Photographic Awards

PHOTOGRAPHIC achievement among high-school students again will gain national recognition through the eleventh annual National High-School Photographic Awards, sponsored by the Eastman Kodak Company.

The 1956 competition is open to students in daily attendance at any public, private, or parochial high school in the U.S. and its territories. Entries can be sent in between January 1 and March 31. Winners will be announced in May. The entries must have been taken by the students themselves since April 1, 1955.

A total of $5,000 in prizes will be presented to the winners. Full information about the competition may be obtained from the National High School Photographic Awards, 343 State St., Rochester 4, N. Y.

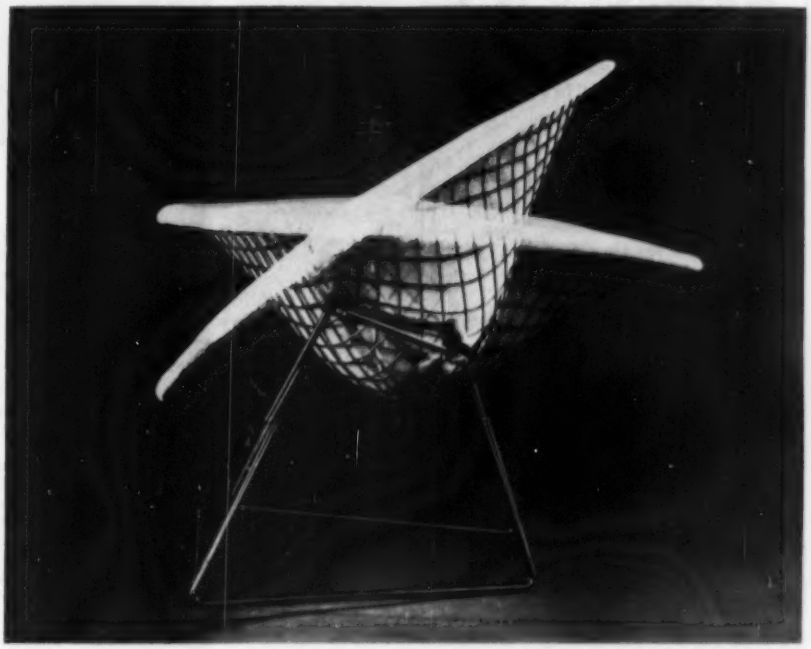
Atlas Scholarship Winners

ERNEST WM. SANDERS, Edwardsburg, Mich., and Dan Wootton, Detroit, have been named winners of the 1955 Atlas Press Company scholarship competition in industrial arts.

The two winners will receive $500 scholarships at Western Michigan College, Kalamazoo, to study to be teachers of industrial arts. Duane Brooks, Edwardsburg, and O. Saiter, Detroit, were the industrial-arts high-school instructors of the winners.

Project Design

What the industrial designers are doing (One of a series)



METAL CHAIR

Designer: HARRY BERTOIA
Manufacturer: KNOLL ASSOCIATES, INC. NEW YORK CITY

IT used to be that you could depend on chairs being made out of wood, fastened together by means of a number of intricate joints, planned so that the person sitting in them had to sit upright and proper, and difficult to maintain because of their construction and ornamentation. Then, not so long ago, some of the pioneers of the contemporary design movement began to analyze the design of chairs in a manner similar to that by which they improved the kitchen stove, the typewriter, the telephone, and hundreds of other objects found in the home.

Their thinking, in contrast with accepted thought of the times, was radical in that they maintained that (*a*) we should use the most suitable material available for chairs, not just the traditional wood, (*b*) with these materials and present methods of fabrication we might be able to get away from some of the problems of permanently joining together pieces of a fibrous material known as wood, (*c*) a chair should be easy to keep clean and in good repair, and (*d*) a chair should not be an instrument of torture but should provide comfort and, at times, relaxation. These designers came up with another idea which had been lost for centuries, that objects are made, first and foremost, for human use. The object should conform to man. Man should not be forced to conform to the object.

With this in mind, the above double exposure of the two extreme positions of Harry Bertoia's "Diamond Chair" is more understandable. It is not a new design for a loudspeaker, nor is it a bird bath which automatically dumps the birds out when the bath is over. It is one designer's solution to the problem of comfortable seating. It does not rely on previous solutions but attempts to put to use an understanding of human anatomy and inclinations, a skill in modern industrial processing, and a knowledge of factors which all go together to make eye appeal.—*Robert A. Tinkham, Assistant Professor of Industrial Education, University of Illinois, Urbana.*

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- Printing Layout & Design
- Practical Problems in Math for
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  Sheet Metal Trades

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Authoritative industrial and automotive Torque Manuals (specifications, etc.) sent to "Shop" instructors upon request.

instructional Resources

Books:

Shopwork on the Farm. (Second Edition.) Jones. New York: McGraw-Hill Book Company, Inc., 1955. Pp. xii + 626. $6.50.

This new edition brings up-to-date the many developments in the field and is a well-illustrated, practical book dealing with tools and basic tool processes used in the farm shop.

It will prove invaluable to farmers, handymen, and homeowners who wish to improve their shop facilities and keep machinery and equipment in the best operating condition with a minimum of expense for repairs and maintenance as well as to teachers of farm shop.

Mack M. Jones is head of the department of agricultural engineering at the University of Missouri, Columbia.

Power Tools . . . and how to use them. Chicago, Ill.: Sears, Roebuck and Company, 1955. Pp. 192. $1.50. Paperbound.

Well-illustrated, this book covers operating procedures, set up and adjustments, and descriptive data, as well as step-by-step information on standard sawing operations, making angle cuts, uses of cut-off board and patterns, special sawing operations, dado and groover saws, moulding head and cutters, abrasive wheels, radial, swing, electric hand and power hack saws.

The text was prepared by Midwest Technical Publications, Inc.

Introduction to Color TV. Kaufman and Thomas. New York: John F. Rider Publisher, Inc., 1954. Pp. 140. $2.10. Paperbound.

Fundamentals of Transistors. Krugman. New York: John F. Rider Publisher, Inc., 1954. Pp. 140. $2.70. Paperbound.

Test Scope Traces. Rider. New York: John F. Rider Publisher, Inc., 1954. Pp. 186. $2.40. Paperbound.

Basic Vacuum Tubes. Rider and Jacobowitz. New York: John F. Rider Publisher, Inc., 1955. Pp. 204. $3.00. Paperbound.

Specialized Tape Recorder Manual, Vol. 1. John F. Rider Publisher, Inc., 1955. Pp. xxiv + 286. $4.50. Paperbound.

Five books in the radio, TV, and electrical field which should be of aid to any instructor in interpreting the information for his classes or adding to his own knowledge in the field. The last volume includes information on all models of tape recorders from 1950 through 1954.

Fred Russell's Car Care: Handy Man's Home Manual: Handy Man's Concrete and Masonry Guide. New York: Arco Publishing Co., Inc. Pp. 144; 144; 144. $2.00 each.

These three books were published to help the average man understand how to do-it-himself. They are well-illustrated and the text is written in an easily understood style.

The engine, fuel system, electrical system, drive line, chassis, body, and tips to the driver are covered in book number one. The book on concrete and masonry covers basic procedures, projects, such as walks, driveways, steps and porches, and repairs and maintenance. Major home projects, home maintenance, furniture and accessories, outdoor projects, and many other items are explained in the how-to-do-it hints in book number three.

Furniture Antiques Found in Virginia. Lynch. Milwaukee, Wis.: Bruce Publishing Co., 1954. Pp. 95. $3.50.

An industrial-arts teacher who has given attention to hidden details of construction presents in this book a collection of measured drawings and photographs of 32 colonial designs that have never appeared before. The book is intended for home and school-shop craftsmen, and includes drawings of original pieces which may be copied or used as a basis for new designs.

Selfwelding. Houck. Cleveland, Ohio: Lincoln Electric Company, 1955. Pp. 128. $1.00.

Explaining the new method "Selfwelding," this book presents 80 projects reported to be within the means and ability of the average householder and opening a wide range of possibilities for metalworking.

By eliminating some of the skills normally required for welding, the "Selfweld" method is said to make welding almost as easy as turning on a light switch. In addition, the new method makes it possible to cut, heat, braze, and solder metal.

Instructors can utilize some of these attractive projects in classes and undoubtedly can gain knowledge from this well-written volume.

Pamphlets:

Industrial Techniques in the School Shop is a booklet designed to aid the high-school shop in adopting techniques that will establish basic concepts in tool engineering. Problems outlined require decision and judgment acquired only by experience and comprehensive knowledge of academic subjects and tools, machines and methods. Price is 96c and the pamphlet is available from Bruce Publishing Company, Milwaukee, Wisconsin.

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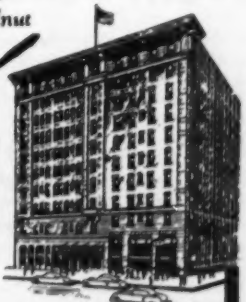

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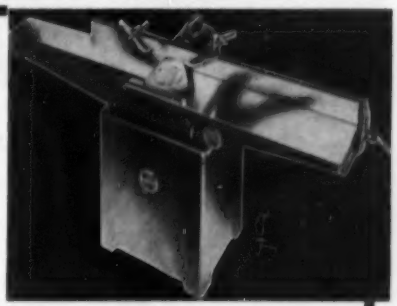

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Exploring Electricity is presented in this booklet as a learn by doing project. Price is $1 and the booklet is available from Science Electronics, Inc., Huntington, L. I., New York.

Short Cuts to Savings with Shellac contains several hundred helpful hints of how to utilize shellac for household or class use. The hints cover a wide variety of subjects from making a base for a lamp to decorations for the dinner table. Free from Shellac Information Bureau, 65 Pine St., New York 5, N. Y.

School Shop—Learn Safe Work Habits Here! This is a booklet emphasizing safe work habits, also helpful in after-graduation employment. Basic safety information and suggestions are included. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 10c per copy, $7.50 per 100 copies.

Offset Reproduction and the Davidson Dual-Lith covers Davidson offset reproduction processes, and contains practical ideas and suggestions useful to any users of photo-offset equipment. A trouble check-chart is also included. Available without cost to Davidson Dual-Lith owners who forward the model and serial number of their equipment or $5 per copy to others. Contact the Davidson Corporation, 29 Ryerson St., Brooklyn 5, New York.

Automotive Instruction in Our Schools outlines and illustrates benefits derived by students, schools, and industry through expansion of vocational education in the field of automotive instruction. The need for trained personnel is shown as well as careers available to eligible young men. Available from National Standard Parts Association, 8 South Michigan Ave., Chicago, Ill., for $1.

Audio-Visuals:

Glass and You shows the contributions glass has made to art, science, industry, and to many world civilizations. It is a 16mm film in color and covers 75 centuries including the creation by Corning of the 200" Mt. Palomar telescope mirror, the most valuable piece of man-made glass in the world. Prints are available on a free-loan basis with the user paying postage only, from Association Films in Ridgefield, N. J. (Broad at Elm), Chicago (79 E. Adams St.), Dallas (1108 Jackson St.) and San Francisco (351 Turk St.).

Nothing But The Best is the title of a 20-minute movie which tells the story of Airco's tungsten inert-gas arcwelding process. In full color with sound, a print of the film may be borrowed from any Air Reduction office or by writing Air Reduction Sales Company, 60 East 42nd St., New York 17, N. Y.

Methods of Teaching Industrial Subjects is a 35mm, color, sound filmstrip enumerating the commonly accepted methods of teaching industrial subjects. Narration for the 52-frame filmstrips runs 15 minutes and is available on record or tape. Price for the set is $22.50 and it is available from The Industrial Education Department, Division of Extension, University of Texas, Austin.

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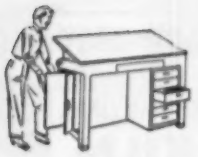

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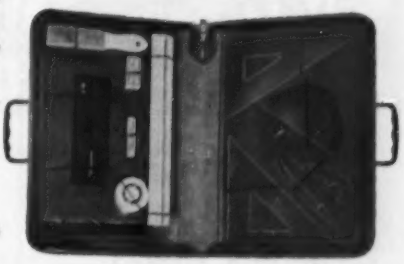

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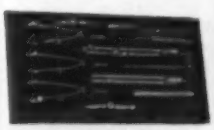

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news from Industry

(Circle the numbers on the card in this issue to secure the items listed.)

Vertical Milling Machine Introduced by South Bend

South Bend Lathe has announced the introduction of a precision vertical milling machine to its line of shop equipment.

The company points out that the new machine is designed for maximum convenience and ease of operation and is adaptable to a wide variety of exacting work. The table is 9" wide and is available in 32" or 42" length with 20" or 30" longitudinal travel, 9½" cross-feed, and 18" vertical feed. Maximum distance, spindle nose to table top, is 20".

A heavily constructed column provides rigid support for the table and head, the company asserts. Universal-type head swivels full 360° for milling, drilling, or boring at any angle. Worm gearing and precision graduations permit quick and easy adjustment of head angle.

For more information write South Bend Lathe, South Bend 22, Ind., mentioning SCHOOL SHOP; or *circle no. D-1 on the business-reply card.*

To Move Heavy Machinery

Heavy machinery and other bulky equipment can be moved with safety—plus economy and speed—with the new Mighty Movers, the manufacturer, Mighty Mover Co., claims.

The Mighty Movers, in the form of sturdy moving dollies, will carry up to 90 tons. They have two 4" roller-bearing cast-iron wheels set in frames of steel. A heavy steel top swivel plate has a standard ½" threaded hole to which machinery is bolted after being raised by either a simple mover's jack or a fork lift.

The company points out that because the former moving tools of pipes, skids, winches, and cables are eliminated, the dangers of injuries are virtually eliminated.

For more information write the Mighty Mover Co., 1482 S. Milwaukee St., Denver 10, Colo., mentioning SCHOOL SHOP; or *circle no. D-2 on the business-reply card.*

Longer Tip Life Claimed for Snap-on's New Screwdrivers

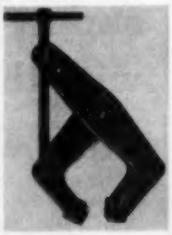
A set of specially hardened Phillips screwdrivers designed to give longer tip life is now available from Snap-on Tools Corporation.

The high-grade alloy steel blades are given a special heat treatment which, the company states, results in great wear-resisting qualities. The blades are chrome plated to eliminate the problem of rust and provide an attractive appearance. The handles are shock proof black plastic, said to be practically unbreakable. Their hexagon shape prevents them from rolling when they are laid down and provides a powerful turning grip without hurting the hand.

Six sizes are available, from 1" to 6" blade length and from $\frac{3}{16}$" to $\frac{3}{8}$" blade diameter.

For more information write Snap-on Tools Corporation, Kenosha, Wis., mentioning SCHOOL SHOP; or *circle no. D-3 on the business reply card.*

Clamp for Precision Work



A new 1" Kant-Twist clamp for small precision work has been put on the market by Saxton Manufacturing Co.

This clamp, like the larger clamps in the company's line, combines the best features of "C" and parallel clamps, the company asserts. The side plates are made of high tensile steel. Each jaw is grooved for gripping rounds, and the jaws rotate in one plane.

For more information write Saxton Manufacturing Co., Inc., El Monte, Calif., mentioning SCHOOL SHOP; or *circle no. D-4 on the business reply card.*

U. S. Plywood Offers Set Of Furniture Projects

Now available to industrial-arts teachers from United States Plywood Corporation are complete plans for making a series of six dis-

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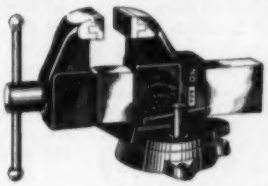

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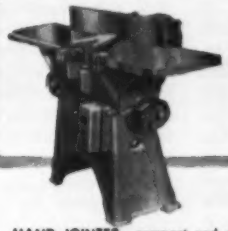
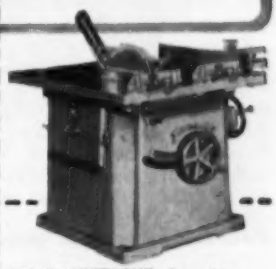
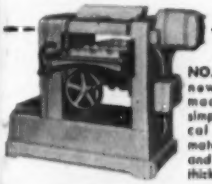


HAND JOINTER—compact and accessible. Built in 8" and 12" width. Table 6'2" long, maximum rabbet depth 9/16". Round, 3 knife safety type cylinder head, 3 HP 3600 RPM motor.

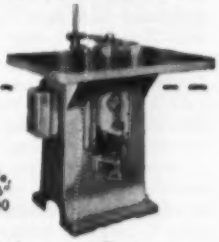


NO. 4 VARIETY SAW—for variety sawing in any shop! Standard table 44" long and 36" wide, plus 19½" extension for carrying rip gauge table.



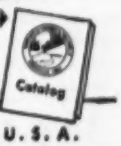
NO. 2 SURFACER—new, streamlined machine. Features simplified, mechanical design. Takes material 18" wide and from ⅛" to 8" thick.

BAND SAWS—machine 20" diameter wheel illustrated. Floor space 24" x 36", horizontal capacity 20", vertical capacity under guide 11". Also 27" 32", and 36" machines available.



SHAPER—1" diameter spindle, with 4½" vertical adjustment, 36" x 26" table, spindle speed—8,500 RPM, floor space—34"x37".

Write for Catalog



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This OLIVER is the most complete Band Saw of its size!

The Oliver 18-inch motor-on-shaft Band Saw has many refinements and adjustments developed for the larger Oliver Band Saws. Table measures 24" x 20"—heavily ribbed, accurately machined. Tilts 45° to right. Has miter cross-cut gauge and parallel ripping fence. Takes 10" under guide, 18" between saw and column. Rips to 11" wide, miters and cross-cuts to 6½". A sturdy Band Saw, precision built to give years of service Write for Bulletin No. 192D.

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Oliver Band Saws also made in 30", 36", 38" sizes. Ask for details.

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tinctively styled furniture pieces designed by world-famous designers.

The projects, which can be used for both industrial-arts and adult-education classes, include a room divider, a screen bar, a storage wall, a cocktail table, a decorated chest, and a serving table-cart. The company reports that they are the only complete plans for such fine furniture pieces on the market today.

A complimentary set of the plans are available to teachers writing the company on their school stationery. Additional plans for use in classes are 25¢ for the set to teachers.

For more information write United States Plywood Corporation, 55 W. 44th St., New York 36, N.Y., mentioning SCHOOL SHOP; or *circle no. D-5 on the business-reply card.*

New Abrasive Disc Device

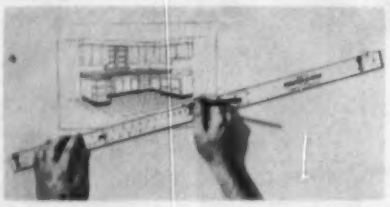
Sanding, grinding, and polishing operations on wood, metal, and plastics are easily performed with Kwik-Sand Roto-5 now being produced by Creative Products Co.

This sanding device uses standard 5" abrasive discs. The company declares it takes only seconds to change from a coarse to a fine grit abrasive for sanding, to apply a special abrasive for tool sharpening, or to attach a lambswool bonnet for buffing. Of special interest to teachers is a safety rim that protects the operator's fingers when working close to the edge of the revolving disc.

The basic sander comes with a spindle for drill press operation, but additional interchangeable spindles for use on motors, grinders, or on a speed lathe also are available.

For more information write Creative Products Co., Dept. 156, Box 66, Wilmette, Ill., mentioning SCHOOL SHOP; or *circle no. D-6 on the business-reply card.*

First Perspective Ruler Introduced by Canlen



Perspect-O-Rule, a complete perspective drawing system on a one-piece instrument, has been developed by Canlen Company. The new rule, claimed to be the first perspective ruler ever devised, has all the information necessary to draw unlimited variations of two-point perspectives, is easy to use, and renders accurate drawings in less than half the usual time, according to the manufacturer.

Accurate precalculated perspective measurements and predetermined locations of vanishing points are printed on a clear plastic straightedge. In addition to measuring, Perspect-O-Rule is used to draw receding lines quickly, automatically, and accurately. Three sizes are available.

For more information write Canlen Company, Wyomissing, Pa., mentioning SCHOOL SHOP; *or circle no. D-7 on the business-reply card.*

Mosaic Tile Table Kits

Requiring only a screwdriver for assembly, the new Ceramicraft ceramic mosaic tile table kits are complete down to the last detail and ruggedly constructed. Each kit contains imported mosaic tile of the proper quantity for each color selected. Frame styles of the tables are round, square, or rectangular, with frames and legs of wrought iron or brass. All styles are available with different leg heights. Additional information may be obtained by writing Ceramicraft, 6 Morris Turnpike, Summit, New Jersey, mentioning SCHOOL SHOP; *or by circling no. D-8 on the business-reply card.*

Mall's New Circular Saw

A new lightweight circular power saw has been announced by the Mall Tool Company. According to the manufacturer, the new saw,

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For more information write Mall Tool Company, 7725 S. Chicago Ave., Chicago 19, Ill., mentioning SCHOOL SHOP; or *circle no. D-9 on the business-reply card.*

New Ajax Fixed Height Stool

A new Ajax stool with fixed height seating has been announced by Ajusto Equipment Company.

Containing a range of seven fixed heights, from 18" to 30", the new stool has been designed to give both strength and rigidity at an economical price, according to the company. Each die-formed leg of the stool is arc welded at two points to the 16" foot ring and stretchers. The bottom of each leg is formed and pierced to receive rubber-cushioned steel glides. The seat and foot ring are made of 18 gage steel and the legs of heavy 14 gage.

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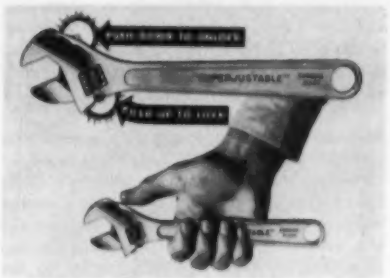
For more information write the Ajusto Equipment Company, 2144 Madison Ave., Toledo, Ohio, mentioning SCHOOL SHOP; or *circle no. D-10 on the business-reply card.*

Pocket-Sized Lubricator

Oil Mate, a new leakproof, pocket-size lubricator for use in shop and mechanics classes, as well as for general use in oiling swivel chairs, typewriters, machine-shop, and other schoolroom equipment, has been introduced by Gray's Limited.

Pen-sized and with a convenient clip for pocket use, Oil Mate is precision engineered, lifetime guaranteed, the manufacturer states. It dispenses oil of any viscosity, with the barrel of the pen being transparent so the amount of oil it contains is apparent. Fingertip pressure of the plunger atop the pen is said to dispense the oil as needed. For more information, write Gray's Limited, 215 W. Seventh St., Los Angeles 14, Calif., mentioning SCHOOL SHOP; or *circle no. D-11 on the business-reply card.*

New Locking Adjustable Wrench



A new locking adjustable wrench has been introduced by J. H. Williams & Company. The company points out that the new locking feature on the wrench offers rapid adjustment, gives a positive lock, and is structurally sound. There are no clumsy or unsightly obstructions, or protrusions. A flick of the thumb locks or unlocks the adjustment in any position.

The wrenches are drop-forged from selected alloy steel in 8", 10", and 12" sizes, ranging in capacity from 0 to 1-5/16".

For more information write the company, 400 Vulcan St., Buffalo 7, N.Y., mentioning SCHOOL SHOP; or *circle no. D-12 on the business-reply card.*

New Literature

A 60-page arts and crafts catalog has been issued by Sax-Crafts, division of Sax Bros., Inc., of Milwaukee. The new catalog covers supplies, kits, tools, and books for leather-

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An eight-page folder describing the new Delta 11" metal-cutting lathe has been issued by Rockwell Manufacturing Company's Delta Power Tool Division. The folder describes the ten basic models of the new lathe and also the new accessories now available with the machine. For a copy of the folder write the company, 400 N. Lexington Ave., Pittsburgh 8, Pa., mentioning SCHOOL SHOP; or *circle no. D-14 on the business-reply card.*

The S.V.E. Educational Catalog recently released by the Society for Visual Education, Inc., lists filmstrips, 2x2 slides, and color slidesets in its 56 pages. All filmstrips are first grouped by grade areas and then listed according to subject matter areas. Slides and slidesets appear in a separate section and are grouped by subject matter. For a free copy write the Society, 1345 W. Diversey Parkway, Chicago 14, Ill., mentioning SCHOOL SHOP; or *circle no. D-15 on the business-reply card.*

"How to teach rotating electric machinery courses without advanced technical training" is the subject of a recent four-page folder published by Crow Electri-Craft Corp. The folder gives full details about the Crow Electri-Kit Model 700 which simplifies dc-ac motor construction and operation for teacher and students. For a free copy of the folder write the company, 1102 Shelby St., Vincennes, Ind., mentioning SCHOOL SHOP; or *circle no. D-16 on the business-reply card.*

Washington . . . (*from page* 48)

something radically different from the mere extension of mechanization, Carey said, adding: "It is a new departure from the older methods of machine production by machine operators, since it represents the automatic operation of machines." In fact, Carey exclaimed, "the production of automation equipment itself can now be produced automatically by automation."

All this will mean "countless problems" in the opinion of labor leaders. Walter Reuther told the Congressional subcommittee that automation will tend to eliminate unskilled and semiskilled jobs; the new jobs created will be at a much higher level of skill. A Ford Motor Company official has said: "The hand trucker of today, replaced by a conveyor belt, might become tomorrow's electronics engineer."

"That sounds very nice," Mr. Reuther commented, "but . . . how does the hand trucker become an engineer or a skilled technician? If automation destroys unskilled jobs and created skilled jobs, means must be found to train large numbers of unskilled workers in the needed skills."

Mr. Reuther is also concerned about the worker who already has a highly specialized skill, but who finds his skill has been made valueless because a machine has taken over his job.

"If automation is going to displace workers in either of these two ways," Mr. Reuther went on, "we shall need a carefully organized retraining program to give them the skills they will need . . .

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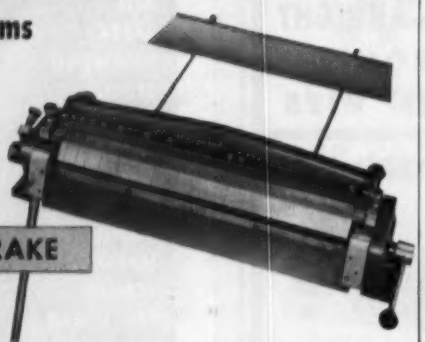

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The program will require not merely training facilities and expert vocational guidance. It will have to include provision for training allowances to replace lost wages during the training period."

In this brief glimpse of the hearings on automation, we are omitting the fascinating stories of what the new machines are doing to people, production, and processes. Rep. Patman has asked each witness to bring "case studies" of automation. Many of the 27 witnesses have done this. You will want to read the record in full when the proceedings are printed. Better drop a note to Rep. Patman's committee and ask that they reserve a copy for you.

Pearson Prognosticates.—We had a long talk with Jim Pearson, head of the USOE Vocational Education Division, last month (always a stimulating experience) during which we covered a lot of topics and issues. In reviewing our notes of this conversation, we find that we asked nine questions and that the answers to each were thorough and comprehensive. Because of lack of space, we had to trim down the report of this session. But here is an abbreviated summary of the questions and answers:

Reporter: What is the implication of the high national productivity and income for vocational education?

Dr. Pearson: Well, for one thing, it should not obscure the fact that we still have a sizeable low-income group, as shown by the Committee on Agriculture in its report. (The report in question is Development of Agricultural Human Resources.) We must all give special attention to this group, develop programs not only for those who live on farms but in urban communities as well. We must do all we can to advise members of these families to take advantage of existing vocational programs and to add new courses when and where they are needed.

Reporter: And these automation hearings—?

Dr. Pearson: In this area, our first task is to get all possible information. We should find out from industry and

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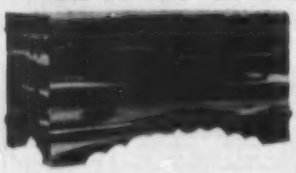
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labor just what happens to people who are affected by automation, and what their training needs are going to be.

Reporter: This implies more research?

Dr. Pearson: It does. Here in the Office of Education we shall of course launch a study on the implications of technological changes on vocational education. Wouldn't it be well for the states, too, to set up research projects on this question?

Reporter: While on this question of research, what other kind of studies do you think would be useful?

Dr. Pearson: The type represented by the bulletin on "What Becomes of the Trade-School Graduate." We need more follow-up studies which will tell us how specific vocational training affects the individual. We also need research into the holding power of vocational education.

Reporter: To turn to some questions of organization and administration. what can be done to improve these areas?

Dr. Pearson: For my part, I'd like to see every member of our division involved in some type of research study. I believe that the discipline thus provided would help each of us do a better job in administration. We also ought to be evaluating our activities. Is the regional conference a good way to solve problems? Is the traditional bulletin worth its cost? And while we evaluate our activities here in Washington, the states may wish to evaluate theirs, asking similar questions.

Reporter: With the coming of the next Congress so near, aren't you soon going to face some questions from Capitol Hill?

Dr. Pearson: Certainly. When the budget hearings begin, Congress will very properly be asking questions. Congressmen will want to know how many more individuals were served with vocational programs as a result of the increased appropriations and how many new communities were provided with vocational-education programs they did not have before. I believe we shall have ready answers that will satisfy Congress completely.

Reporter: There have been some organizational changes here in the Department recently. How have they affected your work?

Dr. Pearson: Two new important additions have been made to the top management. Herold Hunt has become Under Secretary of the Department of Health, Education, and Welfare and J. R. Rackley has been named Deputy

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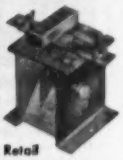
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Reporter: What about the internal reorganization of the Office of Education? Is it working out well for vocation education?

Dr. Pearson: It wasn't so much a reorganization, was it, as a new emphasis on coordinating the functions of research, service, and administration of grants. So far, this new emphasis has not in any way affected adversely the functions of vocational education. Nothing has been transferred. It's quite likely that the new emphasis will result in strengthening our work.

Reporters shouldn't meddle with the tools of the statistician. We violated this rule last month, when we inquired about the trend of enrolment in trade and industrial classes by occupation. Our object was to find out what the public vocational schools are offering and what young and older people are taking; whether there are changes in the occupational patterns for which training is is given.

While the U.S. Office of Education receives these data, state by state, it appears that lack of statistical staff prevents the Office from making an analysis of the facts. With the abandon of a neophyte, we asked whether we could see the state summaries of enrolment in T & I by occupations. We got no further than a sampling of a dozen states. But even these offered an interesting glimpse of America at its training stations.

The most popular occupations for which training is given are easy to spot: machinist, automobile mechanic, carpenter and woodworker, electrician, plumber, needle-trades worker. But during the year that ended in June, 1955, the states were also training for a variety of less well-known occupations. Pennsylvania, for example, was enrolling 9000 persons in policeman classes; and one person in that state was preparing himself for the job of floor layer. New Jersey was training 14 wire weavers; Massachusetts was training one artificial limb fitter; Michigan, one undertaker's assistant. Illinois was preparing a bevy of landscape gardeners. Texas, very understandably, was preparing petroleum production operators; and Louisiana, motor-boat operators. Georgia was training 37 concrete workers—a noble occupation. California, with good justification, was preparing stagecraft workers for its Hollywood industries and—perhaps to keep the western movies in full production—was training 46 gunsmiths. And so it went—through the vast arena of American jobs. This excursion into statistical tabulations, it must be cautioned, did not prove anything—but it was fun. ★

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from Washington

by Michael Paca

The Fabulous Future.—The big news from and about the world of work tells of a fabulous record. The value of all goods and services produced during the three months which ended in September was estimated to be at the annual rate of $392 billion. Further, government statisticians say that the gross national product has been going up every month. And that there is no evidence of a drop.

Where are we going? "Total national output in 1965 should reach $535 billion, an increase of 50 percent from present rates." This sentence is from the Joint Committee on the Economic Report, a Congressional group charged with watching the nation's economy. A $500-billion economy is a fantastically rich economy. Few can visualize what such an economy can produce. The Joint Committee does not try to exercise its imaginative powers, but instead sticks to statistical predictions.

In 1965, the Joint Committee says, 76,000,000 people will be at work (give or take 2,000,000 or 3,000,000 who may be out of work from time to time for various reasons).

In 1965, the 35-hour work week will be firmly established. Many industries will work only 30 hours a week. (Employes are spending fewer working hours at their jobs each year, the annual drop in hours per person being about .8.)

In 1965 vacations will increase from two to four weeks a year for nearly all workers.

In 1965, output per man-hour on the farm will be 2 percent higher than it is now; in the factory and in the office output per man-hour will be about 3 percent higher.

These bare statistics hardly suggest even the outlines of the "fabulous future" (the phrase is David Sarnoff's, chairman of the Radio Corporation of America). They do suggest that educated minds and trained hands will be in great demand for an ever-increasing number of new kinds of jobs and occupations.

What Automation Means.—It was inevitable that Congress would want to get into the act—the act that has everyone talking about automation. The result has been one of the liveliest hearings held on Capitol Hill for many a year. A subcommittee, headed by Rep. Wright Patman (D., Texas), has been taking testimony from the nation's top industrial and labor leaders on what automation may mean for employment, unemployment, productivity, and investment.

Among those who came to give their views were John Diebold, a pioneer in propagandizing for the automatic factory; Don G. Mitchell, head of Sylvania Electric Products; Robert G. Tait, an official of General Dynamics Corporation; and Clifton W. Phalen, head of the Michigan Bell Telephone Co. Government officials also came—Secretary of Labor James Mitchell; Allen V. Austin, head of the National Bureau of Standards. Labor was represented by the ubiquitous Walter Reuther, CIO president, and by James B. Carey, of the electrical workers (CIO), who is usually described in Washington circles as "brilliant."

Two distinct and opposing points of view were expressed by many of the witnesses. Industry spokesmen took the line that automation is nothing new, just a gradual and natural development that began when man harnessed the wind to grind his corn; that it will not create unemployment and dislocations; and that we all ought to think about the good of automation instead of fearing its possible dangers.

To this and similar arguments, James Carey said, "Nonsense." Automation is

(*Continued on page* 44)

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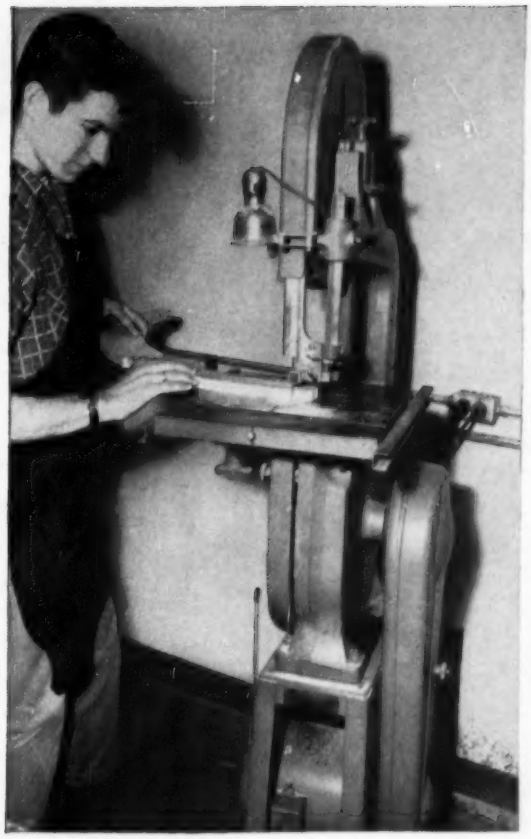

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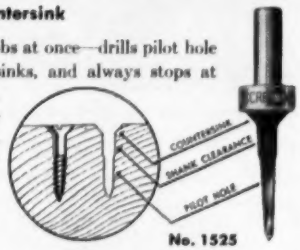

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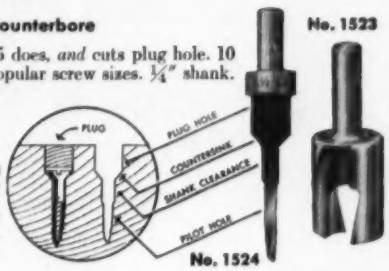

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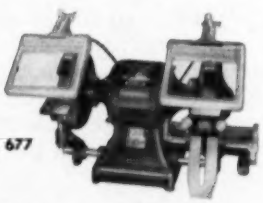
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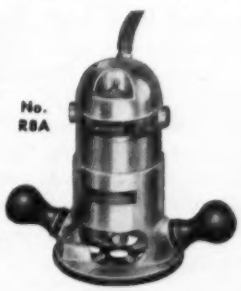
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